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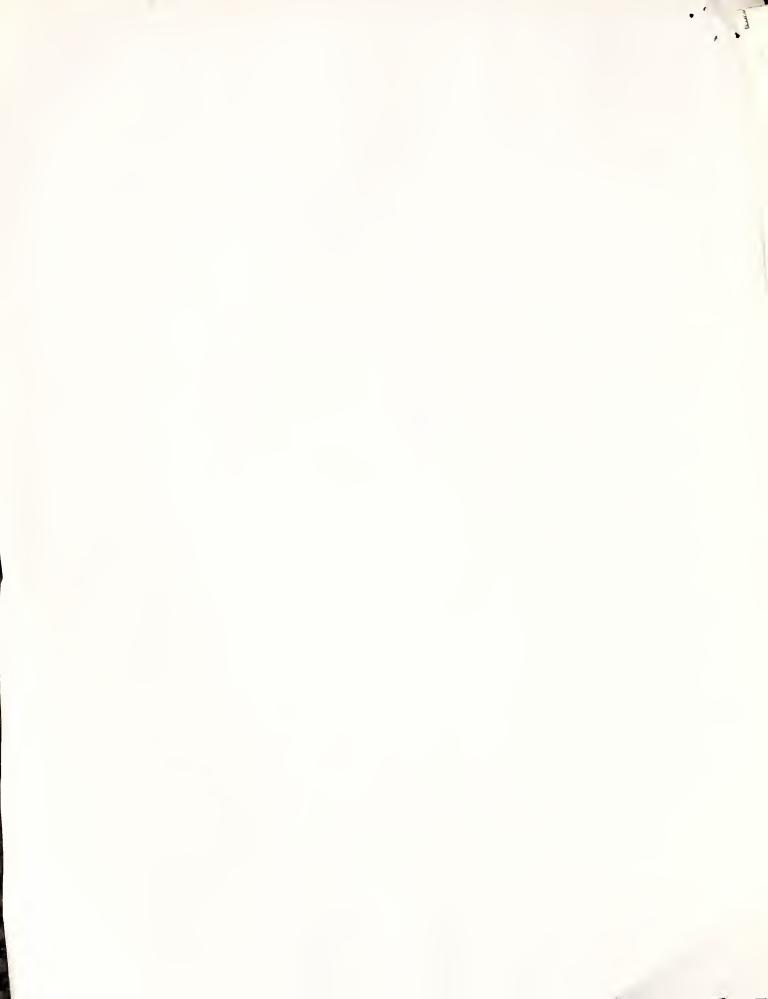FARMER COOPERATIVE SERVICE
WASHINGTON, D. C. 20250

POTENTIAL FOR COOPERATIVE SUGAR BEET PROCESSING
IN SOUTHERN MINNESOTA

Phillip Brown
David Volkin

September 1972

UNITED STATES DEPARTMENT OF AGRICULTURE
FARMER COOPERATIVE SERVICE
WASHINGTON, D.C.

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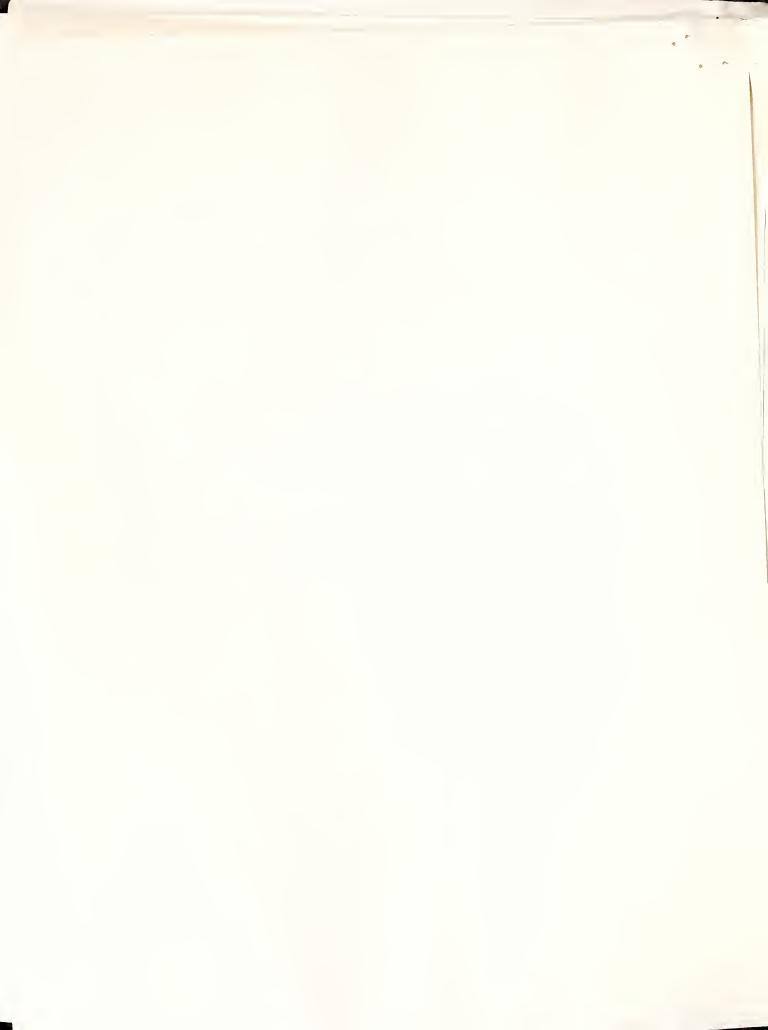ative programs.

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September 1972

CONTENTS

POTENTIAL FOR COOPERATIVE SUGAR BEET PROCESSING
IN SOUTHERN MINNESOTA

In his March 10, 1972 letter to Farmer Cooperative Service, Dale Ruebel, President, Southern Minnesota Beet Growers Association, Olivia, Minnesota, requested that FCS make a study of the potential for a cooperative sugar beet processing plant in Southern Minnesota.

OBJECTIVES AND SCOPE OF STUDY

Subsequent discussions with Messrs Ruebel and David Johnson of the Southern Minnesota group, officials of the St. Paul Bank for Cooperatives, and staff of the University of Minnesota's Agricultural Economics Department provide a basis to delineate the scope of this study to provide answers to the following questions:

1. What are the projected costs and returns of a sugar beet processing plant that has the capabilities of processing 5,000 to 6,000 tons of beets a day thus permitting the slicing of 750,000 tons of beets or more over a 150 day campaign?

2. How will projected sugar beet returns compare with estimated costs and returns of alternative farm crops grown in the same area?

3. What is the optimum location for a processing plant and upwards of 6 beet piling stations?

During the course of a field trip in April we left with Messrs Ruebel and Johnson a format for preparing a cost and return projection based on a proposed turnkey proposal from the BMA - Machinery & Equipment Corporation. We also left with them a worksheet format that would provide acreage and production information over the most recent 3 to 5 year period from sugar beet growers from whom they were obtaining membership sign-ups. A producer committee obtained this statistical information from county offices of the Agricultural Stabilization and Conservation Service. We confirmed these data from Agricultural Reports prepared by the American Crystal Sugar Company's Chaska plant.

We prepared a least-hauling processing plant-piler station site selection analysis from this acreage and production information. This analysis was submitted to the grower organization in letter-reports dated June 5 and July 13, 1972. We used the production and capital cost projections in preparing an analysis of comparative returns from alternative crops as well as a cash-flow analysis of the proposed processing plant.

PROJECTED PRODUCTION

What, where, and from whom is the potential sugar beet volume for the proposed plant?

During the approximate 3-month period from March through May, 1972, a membership committee obtained 307 producer agreements representing 49,178 acres.
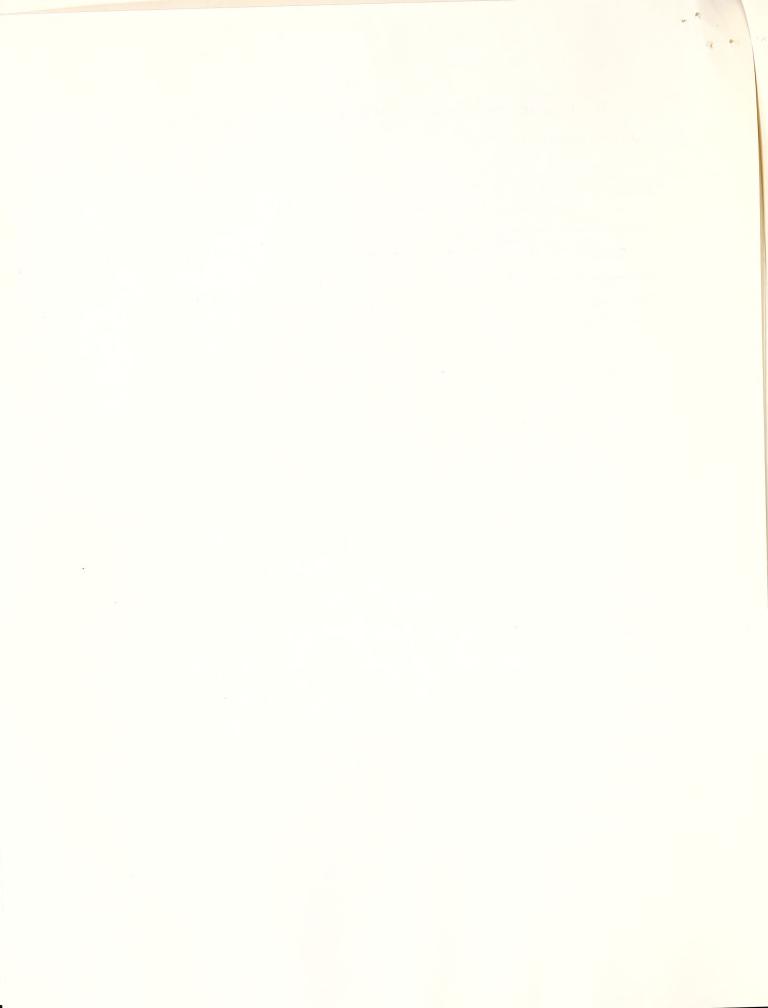
The location and committed acreage of sugar beets is summarized in Table 1 as follows:

Table 1.--Number of producer agreements and total acres signed-up with experienced and inexperienced producers, by county, 1972

County	Number of producer agreements	Sign up acreage		Total acreage
		Experienced producers	Inexperienced producers	
Chippewa	79	6,350	6,255	12,605
Kandiyohi	12	600	1,850	2,450
Redwood	23	2,700	1,630	4,330
Renville	173	14,753	11,745	26,498
Sibley	10	735	170	905
Swift	6	1,550	300	1,850
Yellow Medicine	4	-	540	540
Total	307	26,688	22,490	49,178

These data indicate that potential sugar beet production is concentrated in 2 counties--Renville and Chippewa county, and that the area as a whole is a rather compact one.

The 307 producer agreements include 139 agreements with recent beet history and 168 agreements without beet history. We define a producer agreement supported by beet history recorded with ASCS as an experienced producer. Several individuals considered as new producers, but with beet experience under another producer's account were treated as inexperienced producers in this study. The yield associated with the 307 producer agreements is 15.6 tons of beets per acre.

We projected total average annual production at about 767,000 tons of beets. Crop size could vary from 738,000 to 795,000 tons two out of three years, or from 710,000 to 823,000 tons nine out of every 10 years.

The potential fluctuation in crop size is based on the variation of yields for those experienced producers who had beet crops during each of the five years 1966 through 1970.

Table 2 summarizes the projected yield per acre for the sign-up producers. Projected yields per acre for experienced sugar beet producers reflected their individual yield for those years in which they produced beets from 1966 through 1971. In most cases a simple average yield was chosen. For 12 producers with substantial yield increases for the most recent two or three crops, projected yields were increased by amounts up to seven-tenths of one ton above their average. For 14 producers with a decreasing trend in yields or an unusually high yield in one year, the projected yield was set lower than their average yield.

Following consultation with County Extension Agents of Chippewa, Renville, and Redwood Counties, projected yield per acre for inexperienced sugar beet producers was set near the average of experienced producers for their area or county as shown in Table 2.

Table 2.--Projected sugar beet yield per acre of experienced and inexperienced growers, by county

County or area	:	Average yield for 139 experienced producers	:	Projected yield for 169 inexperienced producers
		Tons		
Swift		14.4		14.4
Chippewa		16.0		16.0
Kandiyohi		-		16.0
Renville		15.4		-
N.E. - Rt. 16 east - Rt. 212 north		14.7		15.0
Other Renville County		15.5		15.4
Sibley		13.8		14.0
Redwood		15.5		15.4

Table 3 shows the distribution of producer agreements on the basis of acreage signed-up. The committed acreage ranges from 20 to 600 acres. About 70 percent of the sign-ups are with growers who have committed 199 acres or less.

Table 3.--Sugar beet acreage distribution of producers signed with Southern Minnesota Beet Growers Association in June 1972

Acreage range	:	Producer agreements	
	:	Number :	Cumulative percent
20-49		6	2
50-99		32	12
100-149		105	46
150-199		69	68
200-249		47	83
250-299		10	86
300-349		23	93
350-399		6	95
400-449		6	97
450-499		2	99
600		1	100

PRODUCTION QUOTAS

A detailed justification statement accompanying Mr. Ruebel's cost projections describes the sign-up growers in terms of their production quotas as follows:

> "The nucleus of the group consists of former growers holding some 30,000 quota acres and has been enlarged to the 50,000 acres necessary to supply a new refinery. The association numbers some 310 farmer growers. The quota acres are retained, under the Federal Sugar Act of 1971, for growers losing their refinery during 1970. An additional 'new plant' quota is also available to these people."

Title III Sec. 302 (b) (3) of the Sugar Act of 1948, as amended, states that "In order to make acreage available for growth and expansion of the beet sugar industry, the Secretary --- shall allocate as needed from the national sugar beet requirements established by him during 1972, 1973, and 1974, the acreage required to yield not more than a total of 100,000 short tons, raw value, of sugar for localities to be served by new or substantially enlarged existing sugar beet processing facilities. (NOTE: The rule of thumb on raw sugar is as follows: 107 pounds of raw sugar is required to make 100 pounds of refined sugar.)

"Allocations shall be for a period of three years and limited for any one processing facility to the acreage required to yield a maximum of 50,000 short tons, raw value (46,729 short tons refined sugar) of sugar and a minimum of 25,000 short tons raw value (23,365 short tons refined sugar) of sugar."

COMMENT: Based on data supplied by Mr. Ruebel, 750,000 tons of beets produced from 50,000 acres will yield 87,300 tons of refined sugar after taking into account a 15 percent sugar yield, an 80 percent extraction, and a 3 percent shrinkage of piled beets. This projects to 1.746 tons of refined sugar produced per acre. Using 1.746 tons per acre as a basis it would appear that in the neighborhood of 26,763 acres could be allocated for a new plant under this Sec. 302 (b) (3) provision for this locality.

How can we place the remaining 23,237 acres (50,000 - 26,763) within allowable quotas? Mr. Ruebel says, "--The quota acres are retained --- for growers losing their refinery during 1970."

Title III Sec. 302 (b) (10) states "The Secretary shall credit to the farm of any producer (or to the producer in a personal history State) who has lost a market for sugar beets as a result of (A) the closing of a sugar beet factory in any year after 1970; (B) the complete discontinuance of contracting by a processor after 1970 in a State; or (C) the discontinuance of contracting by a processor after 1970 in a substantial portion of a State in which the processor contracted a total of at least 2,000 acres of the 1970 crop of sugar beets, an acreage history (or production history) for each of the next three years equal to the average acreage planted on the farm (or by the producer) in the last three years of such factory's operation or processor's contracting."

COMMENT: Minnesota is a personal history State. The termination of American Crystal's Chaska plant operations in March 1971 would appear to conform with the conditions set forth in (A) and (C) of this provision. What this provision means is that a producer with a personal production history will be credited during 1971, 1972, and 1973 with the average acreage he planted in the last three years (1968, 1969, and 1970) of the Chaska plant's operations. Presumably, if a new plant was placed on stream in 1974, personal history growers would have the average annual acreage quota so computed available to them. If the new plant was placed on stream after 1974--and assuming the Sugar Act were extended-- there apparently would be no personal history quota available to growers.

One final note--In a speech given before the annual meeting of the California Beet Growers Association in February 1972, John Mount, Vice President in charge of purchasing for Coca-Cola USA, stated that the whole matter of quotas may be rather academic in view of the fact that since 1965 the United States beet industry has only produced its quota in 2 out of 6 years and that for the 6-year period (1965-1970) the beet industry fell behind over 4 percent in producing its quota. (See Table 4)

Proportionate shares were last in effect for the 1966 and 1965 crops of sugar beets and previous to those years, for the 1955 through 1960 crops.

With the suspension of operations at American Crystal's Chaska plant as well as the Empire State Sugar Company, Auburn, N.Y., and the Maine Sugar Industries plant at Presque Isle, Maine, the total daily slicing capacity of the industry has diminished by around 3.5 percent. Thus the problem is not one of exceeding quotas. Rather it is a problem of attaining current quotas.
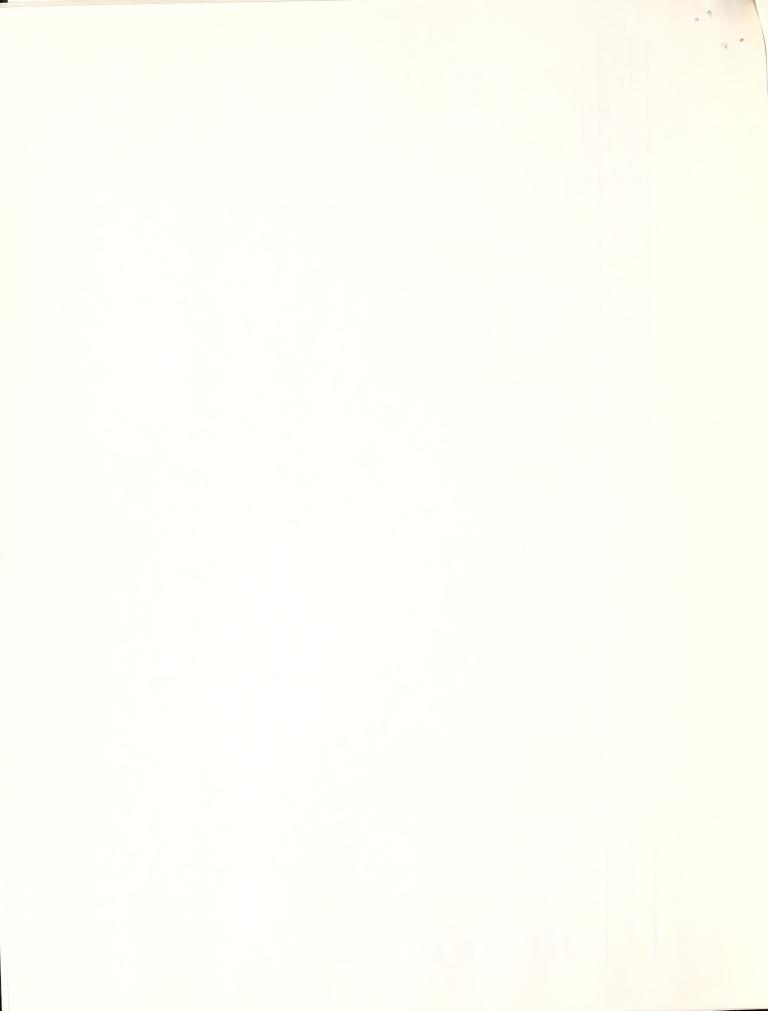
Table 4.--Domestic beet sugar, short tons, raw value

Year	Basic quota	Deficit proration	Deficit	Final quota	Charges (against quota)	Balance shortage (excess)	Acreage allotments 2/	
							Minnesota	United States
				Tons			1,000 Acres	
1961	2,177,773	431,397	-	2,609,170	2,607,166	2,004	-	-
1962	2,795,769	-	295,769	2,500,000	2,415,182	84,818	-	-
1963	2,990,127	-	291,537	2,698,590	2,964,790	(266,200)	-	-
1964	2,698,590	-	-	2,698,590	2,698,514	76	-	-
1965	3,025,000	-	-	3,025,000	3,024,978	22	124.0	1,375.0
1966	3,025,000	-	-	3,025,000	3,024,142	858	125.2	1,435.0
1967	3,215,667	-	-	3,215,667	2,823,695	391,972	-	-
1968 1/	3,311,000	-	195,333	3,115,667	3,085,242	30,425	-	-
1969	3,215,667	-	-	3,215,667	3,215,577	90	-	-
1970	3,597,000	-	-	3,597,000	3,569,398	27,602	144.5	1,450.0
1971 1/	3,454,000	-	47,667	3,406,333	3,437,908	(31,575)	-	-
1972	3,692,000	-	192,000	3,500,000	-	-	-	-
Total 1962-71	-	.	830,306	-	-	238,088	-	-

1/ Despite deficits declared the full basic quota remained available.
2/ Averages were restricted only in the years shown. U.S. includes national reserve of 1,000 acres in 1966 and 1970.

SOURCE: 1961-68, Statistical Bulletin, No. 293, ASCS, USDA; 1969 Sugar Reports 217, June 1970, p. 22; 1970 Sugar Reports 229, June 1971, p. 16; 1971-72 Sugar Reports 241, June 1972, p. 14 - 17, ASCS, USDA.

CAPITAL REQUIREMENTS

Mr. Ruebel's projected capital requirements were estimated at

$35,560,000 summarized as follows:

Capital Investment Required

1.	Physical plant complete with all equipment, sugar storage, pilers, pulp equipment, tare laboratory, pollution control, etc., turnkey not to exceed cost	$ 30,000,000
2.	Land acquisition costs	400,000
3.	Cooperative organizational and legal expense	60,000
4.	Personnel recruitment and training	300,000
5.	Contingencies	1,000,000
6.	Interest during construction	1,500,000
7.	Cost of money	300,000
8.	Working capital	2,000,000
	Total investment	$ 35,560,000

Our comments on these estimates follow:

(1) The $30 million cost figure was submitted by the BMA Machinery

& Equipment Corp., a German builder of sugar beet plants. It was ex-

pressed as a "turnkey - not to exceed" figure. It includes the sugar

refinery complete, pulp drying and pelleting equipment and storage,

bulk sugar storage for 75 percent of a year's campaign, tare laboratory,

up to seven beet pilers, all pollution control equipment and facilities

as well as all other materials and systems necessary for a complete sugar processing facility. It includes piling equipment but excludes the cost of a site and its development. It includes the construction of multiple settling ponds that meet State and Federal pollution control standards. We also are including the added $1,950,000 cost of supplemental equipment that will increase the capacity of the plant to slice 6,500 tons per day. This increased capacity will permit the plant to handle the proposed 750,000 tons to be delivered during a 115 day campaign. A campaign of 115 days duration should enable the plant to attain an 80 percent sugar extraction rate.

(2) The association has 8 sites under consideration for the processing plant. For purposes of our analysis and to be consistent with our recommendation to locate the plant at Renville, we are using the acquisition cost of the site designated as No. 4. It is located in Renville County, Emmet Twp., and described as all of section 3, except railroad right of way, consisting of 620 acres for $501,640.

(3) and (4) The $60,000 estimate for "cooperative organizational and legal expense" and the $300,000 estimate for "personnel recruitment and training" are combined as a capitalized estimate for organization expense of $360,000.

(5) Notwithstanding the builder's "not to exceed" proposal, there is included $1 million to cover the possibility of a construction cost overrun as well as other unforeseen contingencies. The association should be aware that lending institutions recognize the problem of financing facility cost overruns. They generally require that a borrower provide them with some confirmed assurance that it has made arrangements for additional financing that can be drawn upon in the event capital expenditures are greater than originally provided for because of unforeseen contingencies.

(6) We have combined the amount of $1,500,000 designated at "interest on construction cost" and the $1,000,000 of "contingencies" with the $30 million estimate of the turnkey cost of the physical plant. The pro forma balance sheet shown as Table 5 demonstrates how these amounts were allocated between the cost of structures and the cost of machinery and equipment.

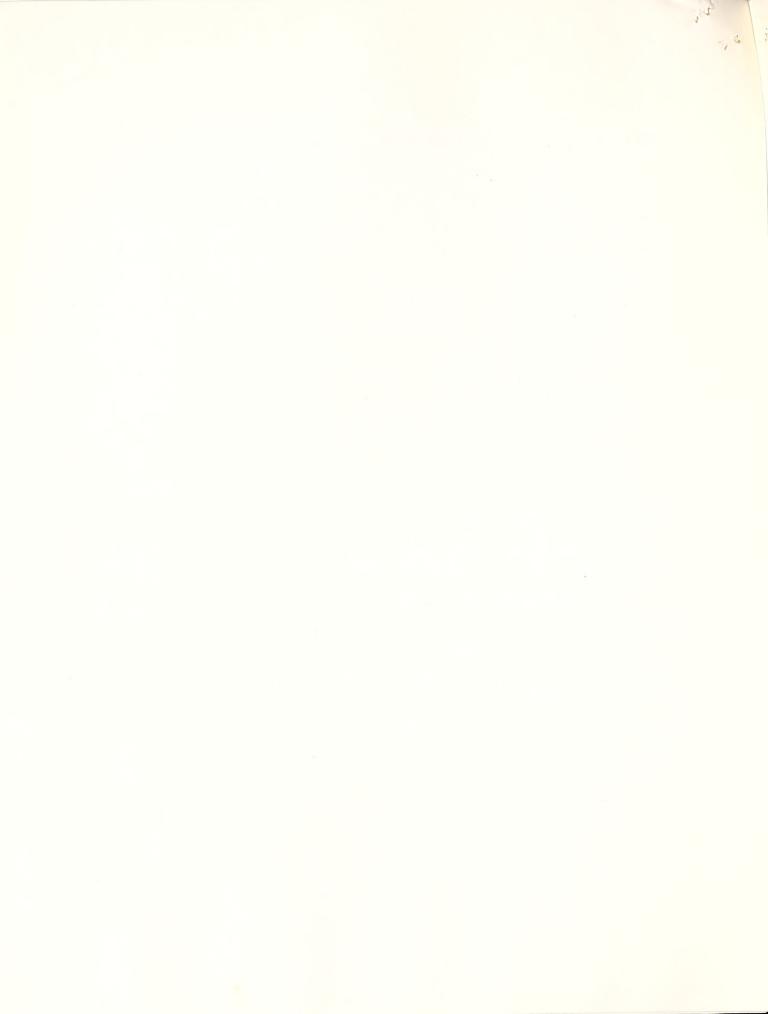The Treasury Department's depreciation guidelines set forth in the Internal Revenue Service publication No. 456 provides a basis to use 45 years straight line depreciation on the structures and 18 years on the machinery and equipment.

(7) We have eliminated the $300,000 estimated "cost of money" item under the assumption that primary financing arrangements can be worked out with the St. Paul Bank for Cooperatives.

Table 5.--Pro forma balance sheet

Assets:
  Cash $ 3,499,900

Fixed assets:
  Land   501,640
  Building-structures 20,659,900
  Equipment 13,790,100   34,450,000

    Total fixed assets   34,951,640

Other assets:
  Organization expense   360,000
  B.C. stock   100

    Total other assets   360,100

    Total assets   38,811,640

Liabilities & net worth:
  Term loan - St. Paul Bank for Cooperatives   23,287,000
  Initial membership signup @ $100 per acre   5,000,000
  Other net worth or subordinated debt   10,524,640

    Total liabilities and net worth $ 38,811,640

(8) We believe the $2 million estimate of working capital required is too low. Mr. John Bunker, President of the Holly Sugar Company, cites a rule of thumb, based on years of experience, that a sugar processing company should have $2 of working capital for every cwt. of sugar processed. Based on Mr. Ruebel's estimated refined sugar production of 1,746,000 cwt., we estimate the working capital requirement to be $3,500,000.

Our revised estimate of capital investment required is as follows:

Physical plant complete with all equipment, sugar storage, pilers pulp equipment, oversized slice and equipment and thick juice tanks, tare laboratory, pollution control, etc., turnkey not to exceed cost	$ 34,450,000
Land acquisition costs	501,640
Organization expense	360,000
Working capital	3,500,000
Total investment	$ 38,811,640

ANTICIPATED REVENUES

Reproduced below is Mr. Ruebel's projected revenues based on a 750,000 ton beet crop.

5,000 tons per day

150 day campaign - 750,000 tons

Assume - 15% sugar   -Chaska 23 yr. avg.
        86% purity   "
        80% extraction   "

Estimate 12.57 gross less 1.97 sales
   and marketing expenses =

$10.60 present net for sugar

Assume 6% dry pulp on beets   -Chaska 23 yr. avg.

$45.00 per ton pulp - present price

Assume 4.85% molasses on beets   -Chaska 23 yr. avg.

$30.00 per ton - molasses - present price

Assume 3% shrink on beets in pile   -Chaska 23 yr. avg.

5,000 x 150 = 750,000/tons beets worked during campaign
750,000 x .97 = 727,500/tons sliced, reflecting shrink
$727,500 \times 0.15 \times .80 \times \frac{2,000}{100} = 1,746,000$ cwt. sugar/1 year
727,500 x 0.06 = 43,650/tons dry pulp/1 year
727,500 x 0.0485 = 35,284/tons molasses/1 year

YEARLY REVENUE

Sugar
1,746,000 x $10.60 =   18,507,600

Pulp
43,650 x $45.00   =   1,964,250

Molasses
35,284 x $30.00   =   1,058,520
    Total revenues   21,530,370 $28.71 per ton

Mr. Ruebel uses $10.60 cwt. as the net returns from sugar sales in the foregoing projection. Net returns are returns after deducting from gross sales marketing expenses such as the Federal excise tax, freight to destination, discounts and allowances, loading and handling, brokerage charges, certain allocated overhead costs such as taxes and insurance, expense of the sales department, public storage costs, and the like. He bases his projection on the Chaska plant's 1971 computation of $10.24 average net returns from sales of the 1970 crop. He concludes "---that at present they should be $10.60 and may climb to $11.00 before all of 1971 sugar is sold." In the Chaska analysis, gross sales amounted to $12.14 per cwt.; sales and marketing expense $1.90; and net $10.24.

We lean to using the somewhat more conservative figure of $10.45 per cwt. This figure is based on a computation of the relationship between the Chaska-Mason City net returns and the Chicago wholesale gross price as indicated in Table 6.

Table 6.---Comparison of Chicago-West wholesale prices with Southern Minnesota-Iowa net returns per cwt.

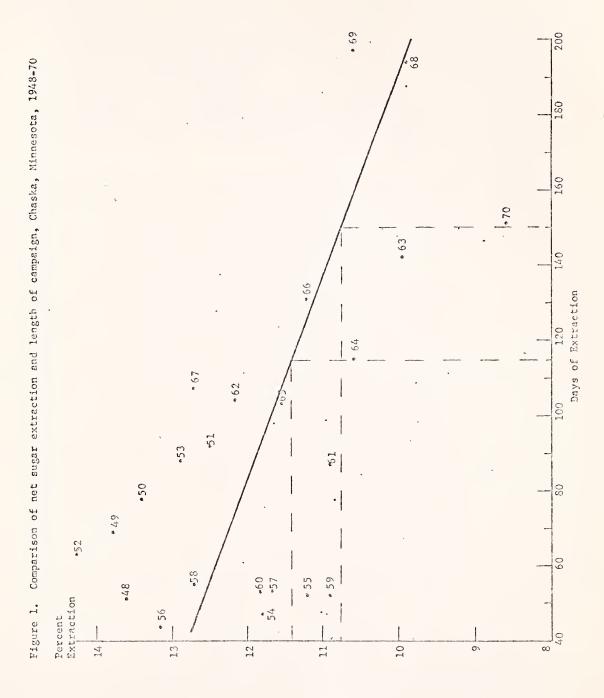| Calendar year	Chicago-West wholesale gross price with tax[1]	S. Minn.-Iowa net returns	Ratio S. Minn.-Iowa to Chicago prices
	Dollars per cwt.		Percent
1966	9.44	8.24	87.29
1967	9.70	8.61	88.76
1968	9.99	8.87	89.24
Last 12 months ended April 1972	11.68	10.45	89.5[2]

[1] "Sugar Statistics and Related Data," Agricultural Stabilization and Conservation Service, USDA, Vol. 1 (Revised), Feb. 1970.
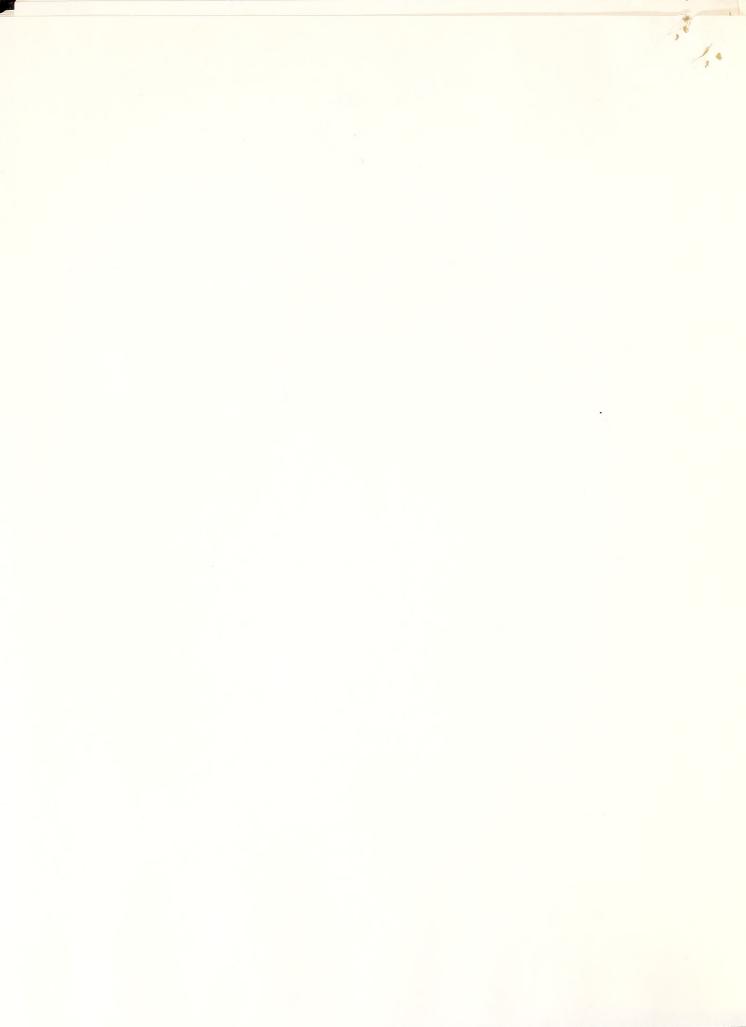[2] Extrapolated.

We also question the use of 23 year averages for the American Crystal's Chaska plant that provides a basis for Mr. Ruebel's projection of an 80 percent extraction over a 150 day campaign for the proposed plant. We plotted Chaska's net extraction percent on beets against that plant's days of extraction and have confirmed what is generally recognized in technical data, that is, the longer the campaign, the lower the percent extraction of sugar from beets.[1] (See Figure 1)

Chaska for example appeared to operate at around a 10.5 percent sugar extraction rate where the 150 day campaign line intersects the regression line in Figure 1. Accordingly, a 750,000 ton crop, after taking into account a 3 percent shrink, would yield 1,527,750 cwt. of sugar. With the additional $1,950,000 investment in oversized slicing and equipment and thick juice tanks, the same tonnage can be handled in a significantly shorter campaign. The resulting 115 day campaign, provides fairly reasonable assurance of a 12 percent sugar extraction rate which should produce the 1,746,000 cwt. of sugar projected by Mr. Ruebel.

[1] Beet Sugar Technology, edited by R. A. McGinnis, Beet Sugar Development Foundation, 1971, p. 95.

Figure 1. Comparison of net sugar extraction and length of campaign, Chaska, Minnesota, 1948-70

Percent
Extraction

14

13

12

11

10

9

8

40   60   80   100   120   140   160   180   200

Days of Extraction

•52
•48
•56
•49
•50
•53
•67
•51
•62
•58
•60
•57
54
•55
•59
•61
•66
•65
•64
•63
•70
•69
•68

Thus, our revised assumptions and anticipated revenues based there-on are summarized as follows:

> 6,500 tons per day
> 115 day campaign
> Yield: 15 percent sugar
> Purity: 86 percent
> Extraction: 80 percent
> Shrinkage: 3 percent on beets in pile
> Beets sliced: .97 x 750,000 = 727,500 tons
> Sugar produced: $727,500 \times .15 \times .80 \times \frac{2,000}{100} = 1,764,000$ cwt.

Appendix Table 1 provides detail on the projected beet procurement and factory operating costs. We derived them from the estimates pro-vided by Mr. Ruebel who in turn relied heavily on BMA cost estimates. We also relied on cost data from other confidential sources. The beet procurement cost estimate of $453,743 may be considered to be quite low relative to similar costs of other plants. It is low because we accepted the premise that the association will not be paying any incoming freight charges, and that there would be no outlying piling stations. This means that all growers except those hauling beyond a point 20 miles from the plant site would haul beets in to the plants' receiving yard at their own expense. A subsidy of 3 3/4 cents a ton mile would be paid to growers hauling from distances over 20 miles from the processing plant. These hauling expenses as well as hauling payments are reflected in cost and returns from sugar beet production presented in another section of this report. We estimate that the association would save around $700,000 in beet procurement costs by following this policy.

Projected Amounts Available for
Distribution-Residual to Growers

Our initial analysis of amounts available for distribution to producers are based on the assumption that all proceeds after payment of all expenses, including depreciation and interest, belong to producers and are considered to be payments for sugar beets delivered to the association.

The producer agrees, however, that his investment in the per unit capital retain certificates of the association shall be in an amount equivalent to the association's term loan repayments plus the amount of the investment the association must make in the bank for cooperatives' "C" stock. Class "C" stock represents the ownership interest of borrowers in a bank for cooperatives. Borrowers acquire such stock by purchasing one qualifying share, by investing on the basis of a percentage of interest paid, and through receipt of patronage refunds paid in the form of "C" stock.

We have assumed that there will be a 750,000 ton crop delivered by member producers resulting in total revenues of $20.9 million as detailed in Table 7. The net amount available for distribution for payments of interest and payments to producers amounts to around $16 million.

Table 7.--Pro forma statement of operating results based on 750,000 tons
        sugar beets delivered

Gross sugar sales - basic price (Chicago-West)

   1,746,000 cwt. x $12.11 ($11.71 ⊹ .40 prepay)   = $ 21,147,640

Less: Marketing costs
   Brokerage & commission $ 165,900
   Storage-public & offsite   158,900
   Freight   923,600
   Discounts & allowances   352,700
   Shipping & handling   286,300
   Insurance & taxes   69,900
   Excise taxes   873,000
   Sales expenses   26,200
   Other   52,400   . 2,901,900

     Net sugar sales   18,245,740

Gross beet pulp sales:
   Yield: 6% dry pulp on beets sliced
   727,500 x .06 = 43,650 tons @ $45 = $ 1,964,250

Gross molasses sales:
   Yield: 4.85% molasses on beets sliced
   727,500 x .0485 = 35,284 tons @ $30 =   1,058,520

     Total gross sales - pulp & molasses   3,022,770

   Less: Marketing costs estimated @ 10
     percent of by-products gross sales   302,277   2,720,493

     Total revenues   20,966,233

Less: Expenses[1]/
   Beet procurement costs   453,743
   Factory operations   4,506,477   4,960,220

   Net available for interest pay-
     ments and payments to producers $ 16,006,013

1/ See Appendix Table 1 for cost details.

In our first example presented in Table 8, we have assumed that of the $38,811,640 capital required, $23,287,000, or 60 percent, would be supplied as loan capital from the bank for cooperatives as a 12 year term loan for which interest payments would be required, and the remaining $15,524,640, or 40 percent, would be "free" capital. "Free" capital is defined as equity capital which, if initially obtained from growers, would be equivalent to $14,744,640 divided by 49,178, or $300 per acre signed up. Term loan interest rates used are 7 percent, seasonal loans 6 percent, and the override for purchase of the banks "C" stock, 10 percent of the interest payments.

The analysis in Table 8 indicates that total amounts available for distribution over the 12 year period of term loan repayments range from $18.85 to $20.84 per ton of beets delivered. And if per unit capital retains are made as projected, that is, in an amount equivalent to the annual repayments on the term loan plus the investment in the bank for cooperatives "C" stock, then this retain will range from $2.84 to $2.64 per ton of beets delivered from the first through the 12th year of repayments. This means that net cash returns to producers will range from $16.01 the first year to $18.20 the 12th year per ton of beets delivered.

Table 8.--Analysis of funds available for distribution--750,000 ton crop

Year ended	Available for distribution before interest payments	Interest payments on Bank for Cooperatives loans Term [1]	Interest payments on Bank for Cooperatives loans Seasonal [2]	Total Interest payments Column 2 + 3	Net available for distribution Column 1 - 4	Form of distribution Non-cash equivalent to Repayment term loan	Form of distribution Non-cash equivalent to Investment "C" stock	Total non-cash Column 6 + 7	Cash	Restatement of columns 5, 8, and 9 of amounts available for distribution (750,000 tons) Total	Non-cash	Cash
	1	2	3	4	5	6	7	8	9			
1	16,006,013	1,630,090	240,000	1,870,090	14,135,923	1,940,585	187,009	2,127,594	12,908,329	18.85	2.84	16.01
2		1,494,249	240,000	1,734,249	14,271,764	1,940,585	173,425	2,114,010	12,157,754	19.03	2.82	16.21
3		1,358,403	240,000	1,598,408	14,407,605	1,940,585	159,841	2,100,426	12,307,179	19.21	2.80	16.41
4		1,222,567	240,000	1,462,567	14,543,446	1,940,585	146,256	2,086,841	12,456,605	19.39	2.78	16.61
5		1,086,726	240,000	1,326,726	14,679,287	1,940,585	132,672	2,073,257	12,606,030	19.57	2.76	16.81
6		950,885	240,000	1,190,885	14,815,128	1,940,585	119,088	2,059,673	12,755,455	19.75	2.75	17.00
7		815,044	240,000	1,055,044	14,950,969	1,940,585	105,504	2,046,089	12,904,880	19.93	2.72	17.21
8		679,203	240,000	919,203	15,086,810	1,940,585	91,920	2,032,505	13,054,305	20.11	2.71	17.40
9		543,362	240,000	783,362	15,222,651	1,940,585	78,336	2,018,921	13,203,730	20.30	2.70	17.60
10		407,521	240,000	647,521	15,358,492	1,940,585	64,752	2,005,337	13,353,155	20.48	2.68	17.80
11		271,680	240,000	511,680	15,494,333	1,940,585	51,168	1,991,753	13,502,580	20.66	2.66	18.00
12		135,840	240,000	375,840	15,630,173	1,940,565	37,584	1,978,149	13,652,024	20.84	2.64	18.20

1/ Interest on $23,287,000 Bank for Cooperatives term loan; 7 percent on unpaid balance--annual payments on principal.
2/ Interest on seasonal loan estimated $4,000,000 average annual principal outstanding; 6 percent on unpaid balance.
3/ Override: 10 percent of interest payments.

Projected Return - Expanded Debt

It is highly possible the association will raise only $5,000,000 in equity capital and that in addition to the bank for cooperatives' primary term loan of $23,287,000 the remaining $10,524,640 also will be borrowed capital from secondary loan sources. The analysis of funds available for distribution shown in Table 9 reflects this amount as being borrowed from a source other than the bank for cooperatives; interest payments on this additional debt are estimated at 9 percent on the unpaid balance; and repayments on the principal made over a 15 year period.

Under these assumptions, total amounts available for distribution over the 15 year period of the term loan repayments range from $17.58 at the end of the first year of operations to $20.50 at the end of the 12th year. After the 12th year the association may want to consider the possibility of continuing its per unit capital retain program in order to accrue the funds required to initiate a program of redeeming outstanding per unit retain certificates on a first-in, first-out basis. The example shown in Table 9 does not reflect this policy decision. The per unit capital retain investments will range from $3.77 the first year to $3.57 the 12th year with net cash returns to producers ranging from $13.81 to $16.93 over the same 12 year period per ton of beets delivered.
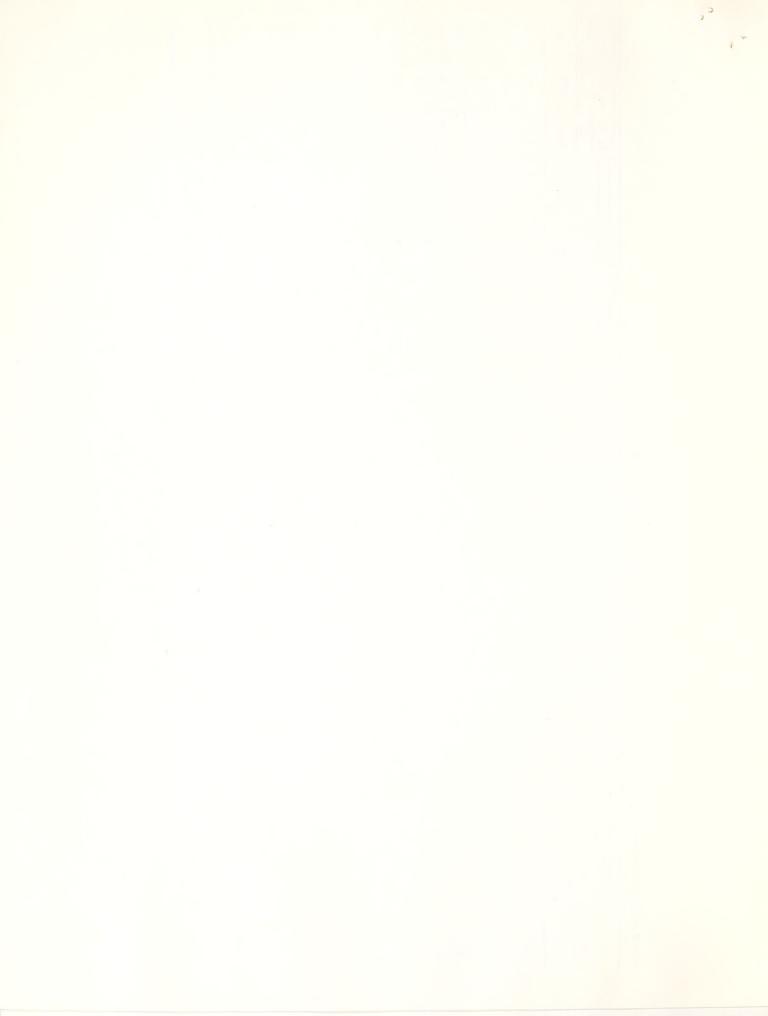
Table 9.--Analysis of funds available for distribution--750,000 ton crop

Year ended distribution	1 Available for distribution before interest payments	2 Interest payments on Bank for Cooperatives loans Term 1/	3 Seasonal 2/	4 Interest payments on secondary term loans 3/	5 Total interest payments Column 2 + 3 + 4	6 Net available for distribution Column 1 - 5	7 Repayment term loan	8 Investment "C" stock	9 Repayment secondary loan	10 Total non-cash Column 7 + 8 + 9	11 Cash	Restatement of columns 6, 10, and 11 of amounts available for distribution on a per ton basis — Total	Non-cash	Cash
1	16,006,013	1,630,090	240,000	947,218	2,817,308	13,188,705	1,940,585	187,009	701,650	2,829,244	10,359,461	17.58	3.77	13.81
2	-	1,494,249	240,000	884,069	2,618,318	13,387,695	1,940,585	173,425	701,650	2,815,660	10,572,035	17.85	3.76	14.09
3	-	1,358,408	240,000	820,921	2,419,329	13,586,684	1,940,585	159,841	701,650	2,802,076	10,784,608	18.11	3.73	14.38
4	-	1,222,567	240,000	757,772	2,220,339	13,785,674	1,940,585	146,256	701,650	2,788,491	10,997,183	18.38	3.72	14.66
5	-	1,086,726	240,000	694,624	2,021,350	13,984,663	1,940,585	132,672	701,650	2,774,907	11,209,756	18.64	3.70	14.94
6	-	950,885	240,000	631,475	1,822,360	14,183,653	1,940,585	119,088	701,650	2,761,323	11,422,330	18.91	3.68	15.23
7	-	815,044	240,000	568,327	1,623,371	14,382,642	1,940,585	105,504	701,650	2,747,739	11,634,903	19.17	3.66	15.51
8	-	679,203	240,000	505,178	1,424,381	14,581,632	1,940,585	91,920	701,650	2,734,155	11,847,477	19.44	3.65	15.79
9	-	543,362	240,000	442,030	1,225,392	14,780,621	1,940,585	78,336	701,650	2,720,571	12,060,050	19.70	3.62	16.08
10	-	407,521	240,000	378,881	1,026,402	14,979,611	1,940,585	64,752	701,650	2,706,987	12,272,624	19.97	3.61	16.36
11	-	271,680	240,000	315,733	827,413	15,178,600	1,940,585	51,168	701,650	2,693,403	12,485,197	20.23	3.59	16.64
12	-	135,840	240,000	252,584	628,424	15,377,589	1,940,585	37,584	701,650	2,679,819	12,697,770	20.50	3.57	16.93
13	-	-	240,000	189,436	429,436	15,576,577	-	(187,009)	701,650	514,641	15,061,936	20.77	.69 4/	20.08
14	-	-	240,000	126,287	366,287	15,639,726	-	(173,425)	701,650	528,225	15,111,501	20.85	.70 4/	20.15
15	-	-	240,000	63,139	303,139	15,702,874	-	(159,841)	701,540	541,699	15,161,175	20.93	.72 4/	20.21

1/ Interest on $23,287,000 Bank for Cooperatives 12-year term loan; 7 percent on unpaid balance.
2/ Interest on seasonal loan estimated $4,000,000 average annual principal outstanding; 6 percent on unpaid balance.
3/ Interest on $10,524,640 secondary 15-year term loan; 9 percent on unpaid balance.
4/ Association should consider continuance of per unit capital retains at prior year's level to provide funds to redeem certificates issued in prior years on first-in, first-out basis.

To recap, the amounts available under the two term debt alternatives we projected are summarized as follows:
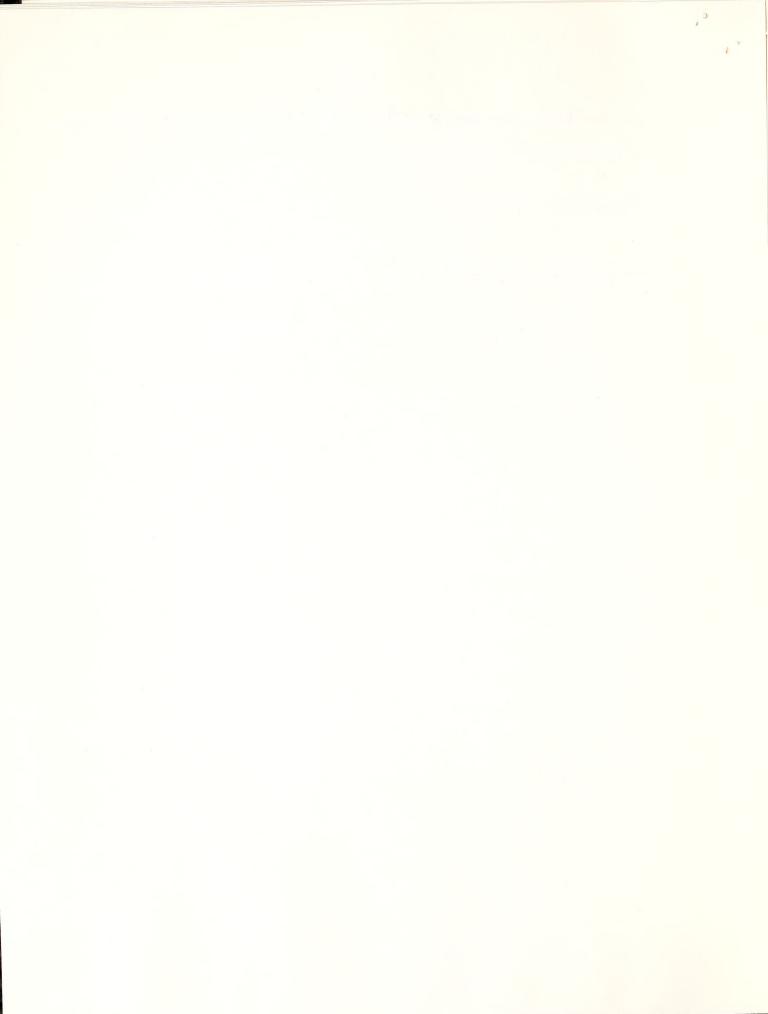
Situation 1 -- 750,000 ton crop

Term debt (Dollars)	Total amount available for distribution to producers (first year) (Dollars)	Non-cash (Dollars)	Cash (Dollars)
(a) 23,287,000	18.85	2.84	16.01
(b) 33,811,640	17.58	3.77	13.81

Projected Returns - Constant Per Unit Capital Retains

The preceding analyses of amounts available for distribution to growers use the per unit capital retain method for acquiring capital. The amounts of such investments are tied to and vary directly with the repayments on the outstanding term loans plus the required investments in the bank for cooperative's "C" stock. The amounts of such investments also could be increased by the board of directors to finance further expansion or to accelerate a revolving program.

A more traditional approach may evolve from decisions to fix the per unit capital retain at a definite--not a variable--amount in combination with using a portion of the depreciation reserve as a source of funds available to repay term loan obligations.

An example of this approach is indicated in the find flow analysis presented as situations 2 (a) and 2 (b). Here again, assumptions as to size of crop handled and costs and returns coincide with the analyses shown in situation 1 (a) and 1 (b). However, we arbitrarily decide that the cooperative should maintain its net working capital at the $4 million level and that its per unit capital retains will, for purposes of discussion, amount to $2 per ton delivered to the association. The pro forma balance sheet shown as Table 5 provides the starting point for the cash flow statement illustrating the consequences of such policy decisions over the assumed bank for cooperative's 12 year term loan repayment period.

Situation 2 (a) -- 750,000 ton crop: $23,287,000 12 year term loan

Beginning net working capital		$ 3,499,900
Add: Increases		
Amounts available for distribution	$ 178,596,581	
Less: Cash payments for sugar beets delivered	(160,596,581)	
Amount retained as investments in per unit capital retains @ $2.00 per ton		18,000,000
Depreciation charges retained		14,702,712
Total increases		32,702,712
Less: Decreases		
Payments on term loans		23,287,000
Investments in B.C. "C" stock		1,347,555
Amortization of organization expense		360,000
		24,994,555
Net increase (decrease)		7,708,157
Ending working capital balance		$ 11,208,057
Average amount available for distribution (per ton)		$ 19.84
Cash		17.84
Non-cash		$ 2.00

In situation 2 (a) the associations net working capital has increased over the 12 year period by $7.7 million dollars as a result of depreciation charges and per unit capital retains exceeding term loan payments and investments in the bank for cooperative's "C" stock. Net annual cash payments to producers average $17.84 per ton delivered after taking into account the $2.00 per ton per unit capital retain.

Situation 2 (b) -- 750,000 ton crop: $33,811,640 term loans; 12 year B.C. term loan; 15 year secondary term loan (projected through 12th year)

Beginning net working capital		$ 3,499,900
Add: Increases		
Amounts available for distribution	$ 171,397,769	
Less: Cash payments for sugar beets delivered	(153,397,769)	
Amount retained as investments in per unit capital retains @ $2.00 per ton		18,000,000
Depreciation charges retained		14,702,712
Total increases		32,702,712
Less: Decreases		
Payments on term loans (projected through 12th year)		31,706,800
Investments in B.C. "C" stock		1,347,555
Amortization of organization expense		360,000
Total		33,414,355
Net increase (decrease)		(711,643)
Ending balance		$ 2,788,257
Average amount available for distribution		$ 19.04
Cash		17.04
Non-cash		$ 2.00

In situation 2b, the net working capital balance at the end of 12 years falls short of the $4 million goal by the amount of $1,211,743 signaling the fact that the $2 per unit capital retain is not adequate to meet the goal. To achieve this goal, the investments in per unit capital retains would have to be increased by $1,211,743 by reducing the cash payments for sugar beets delivered. Under these circumstances, the 12 year total capital retains would be increased from $18,000,000 to $19,211,743, or from $2.00 to $2.14 per ton and the average cash returns to producers reduced from $17.04 to $16.90 per ton of beets delivered.

In other words, with a total term debt load of $33.8 million, if the association plans to build capital by members investing a pre-determined flat amount in per unit capital retains, this investment should be in the neighborhood of $2.25 per ton delivered.

Projected Returns - Competitive Price Paid for Beets

In projecting "amounts available for distribution" we have shown the results of following either one of the following policy decisions:

1. The so-called "residual concept" whereby all proceeds left over after paying all expenses--including depreciation and interest--are paid to producers. The form of the payment is part in cash and part in per unit capital retain certificates which represent the investment of growers in an amount equivalent to the sum of all payments on the principal

of term loans outstanding, investments in the "C" stock of

the bank for cooperatives plus additional amounts that the

board of directors may require for working capital pur-

poses. The association operates with zero net savings.

2. Same as above except that the per unit capital retains

are flat amounts--$2 per ton of sugar beets delivered in

our example--which is supplemented in part by the de-

preciation reserve as a source of funds to meet term loan

repayments and related investments. We also have added

a feature aimed at protecting the association's net work-

ing positon at the $4 million level. This would result in

increasing the per unit capital retain investments when

such circumstances occurred. The association operates

with zero net savings.

We are presenting a third alternative based on a constraint placed

in the total amounts paid to producers for sugar beet deliveries. This

constraint would limit payments to producers to "the competitive price,"

whatever that price may be. It could result from a requirement by a

lending institution that may have several sugar beet loans outstanding

and whose interest would stem from a desire that these borrowers avoid

the stresses and strains on membership relations where different sets

of growers end up with different payments for sugar beet deliveries.

Under this alternative if payments to producers amounted to $15.75 per ton of beets delivered to the association for example, the amounts in excess of the total available for distribution would represent the net savings of the organization. These amounts would be treated as patronage refunds. Here again the board of directors would use its discretion as to the form of such distributions. In our projections we assume that the association will follow the practice of most cooperatives that need to build their net worth. That is, 20 percent of the patronage refunds would be in cash; 80 percent non-cash represented by a form of allocated equity. We also are assuming that the per unit capital retain will be $2 per ton of beets delivered to the association.

The effect on the association's working capital position based on the assumptions and policy decisions outlined in the foregoing are set forth in the following fund flow analyses presented as situations 3 (a) and 3 (b).

Under 3 (a), the association builds net worth by members' investments of the non-cash portion of their patronage refunds as well as through their per unit capital retains. Thus, at the end of 12 years, net worth will have increased by the amount of $47.4 million, of which $18 million came from per unit capital retains, $29.4 millions from investments of patronage refunds. Net cash payments for beets amount to $14.57 per ton after taking into account the $2 per ton retain and including the cash portion of the patronage refund which will average 82 cents per ton.

Situation 3 (a) -- 750,000 ton crop: $23,287,000 term loan. Payment to
producer: $15.75 per ton delivered.
Projection made through 12th year.

Beginning net working capital		$ 3,499,900
Add: Increases		
Net savings for period:		
Amount available for distribution	$ 178,596,581	
Less: Payments to producers	(141,750,000)	36,846,581
Amount retained as investments in per unit capital retains @ $2.00 per ton		18,000,000
Depreciation charges retained		14,702,712
Total increases		69,549,293
Less: Decreases		
Payments on term loans		23,287,000
Investments in B.C. "C" stock		1,347,555
Amortization of organization expense		360,000
Cash patronage refunds (20% of $36,846,581)		7,369,316
Total decreases		32,363,871
Net increase (decrease)		37,185,422
Net working capital balance end of 12th year		$ 40,685,322
Cash payments to producers:		
Advanced for beets (per ton)	$	13.75
20% cash patronage refund		.82
Total	$	14.57

Situation 3 (b) -- 750,000 ton crop: $33,811,640 term loans - 12 year B.C. term loan; 15 year secondary term loan. Projection made through 12th year. Payments to producers: $15.75 per ton.

Beginning net working capital		$ 3,499,900
Add: Increases		
Net savings for 12 year period:		
Amount available for distribution	$ 171,397,769	
Less: Payments to producers	(141,750,000)	29,647,769
Amount retained as investments in per unit capital retains @ $2.00 per ton		18,000,000
Depreciation charges retained		14,702,712
Total increases		62,350,481
Less: Decreases		
Payments on term loans (projected through 12th year)		31,706,800
Investments in B.C. "C" stock		1,347,555
Amortization of organization expense		360,000
Cash patronage refunds (20% of $29,647,769)		5,929,554
Total decreases		39,343,909
Net increase (decrease)		23,006,572
Net working capital position end of 12th year		$ 26,506,472
Cash payments to producers:		
Advanced for beets (per ton)		$ 13.75
20% cash patronage refund		.66
Total		$ 14.41

The association's net working capital increased by the amount of $37.1 million primarily as a result of the increase in net worth and depreciation charges retained exceeding the payments on outstanding loans and cash patronage refunds.

Both the foregoing projections 3 (a) and 3 (b) reflect substantial improvement in the association's net working capital position. Thus a note of caution should be interjected. First, the projected net savings could be overstated to the extend that revenues do not meet expectations as a result of adverse market conditions, or actual costs may exceed those that are projected as a result of unforeseen expenses, increased labor, and transportation rates, and the affect of inflation on costs in general. Secondly, the association may incur substantial facility expenditures as a result of expansion requirements, changes in technology, and the like. Third, the board may want to consider initiating a revolving fund program, that is, a systematic program of redeeming equities on a first-in, first-out basis. Fourth, the amount, repayment provisions, and interest rates of the projected term loans may vary substantially from those shown. Fifth, potential management or marketing contracts or lease-back arrangement may have significant financial and operating implications and finally, the volume and quality of beets delivered to the association may fall short of the amounts projected.

FEDERAL INCOME TAX IMPLICATIONS

The 1962 amendments to the 1954 Internal Revenue Code make it quite clear that amounts received by cooperatives in the course of their business activities with their patrons are included in computing the taxable income of either the cooperative or the patron, thus subjecting these amounts to single current tax. The 1966 amendments to the tax laws apply directly to marketing cooperatives that use per unit capital retain financing. This amendment was designed to collect Federal income taxes currently at either the cooperative or patron level on amounts patrons furnish as capital on the basis of the dollar value or the physical volume of products marketed through the cooperative.

Cooperatives have a choice as to whether the tax consequences will be borne by the cooperative or by their patrons. In our projections we have assumed that the tax consequences will be borne by the association's member-growers and have incorporated these expenditures in our estimate of growers net returns from sugar beets. Thus, when our projections assume that the cooperative will operate at zero net savings, we also assume that the growers agreed to include in their gross income currently the face amount of the certificate he will receive from the cooperative representing the per unit capital retains. By the same token, when we project net savings, we assume further that these savings belong to its patrons, are distributed as patronage refunds, and that the recipient agrees to include the entire amount of the distribution--whether in cash or non-cash form--in his gross income currently.

If growers did not consent to include in their gross income the face amount of the per unit retain certificates or the non-cash portion of their patronage refunds, the tax consequence would be borne by the cooperative with the result that its working capital position would be affected to the extent of the taxes it would have to pay.

The grower group should retain the services of a competent attorney who is familiar with State and Federal laws relating to farmer cooperatives. He should provide guidance in preparing organization papers so that they reflect the growers desires on the "rules of the game" under which they want to organize and operate. In addition, these papers should reflect conformance with the State's cooperative laws and will facilitate compliance with the Capper-Volstead Act, Federal tax laws, and meet bank for cooperatives eligibility requirements.

NET RETURNS FROM SUGAR BEETS AND ALTERNATIVE CROPS

This section of our report compares returns for sugar beets and alternative crops on two bases, each using different source data. The first approach compares returns on a per acre basis. The second approach compares total farm income derived from various crop and livestock enterprises.

Comparison of Per Acre Returns

Corn and soybeans are the major crops that compete for resources with sugar beets, while oats, wheat, plus flaxseed in the western counties are the minor competing crops. Even though net returns from the minor crops are much less than for corn and soybeans, the timing of their production is different and they contribute to income by making fuller use of resources. The following discussion of commodity prices and production costs precedes the comparison of per acre returns.

Alternative Crop Prices

Average prices received by Minnesota producers for recent years as shown in Table 10 are generally representative of prices producers may expect to receive for the next several years. The average price for corn excludes the 1970 price as being excessively high and unrepresentative of expected future prices. The corn price shown is several cents above applicable county price support loan rates, depending upon moisture content. The flaxseed average price was limited to the three recent years as they more nearly represent prices which would occur with the current price support level and supply situation.

Table 10.--Market prices for selected crops in Minnesota

Crop	Base period	Average market price per bushel
		Dollars
Corn	1967-69, 71	1.01
Soybeans	1967-71	2.60
Wheat	1967-71	1.89 1/
Oats	1967-71	.59
Flaxseed	1969-71	2.53

1/ Includes price support payment.

SOURCE: Crop Values, Statistical Reporting Service, USDA, annual issues.

Producer payments for sugar beets are those derived in this study and are summarized in Table 11. Sugar Act payments are based upon 15.2 percent sugar in beets by individual test. This results in commercially recoverable sugar of 2.084 hundredweight, raw value, per ton of beets.1/ Elsewhere in this study 15.0 percent sucrose in cossettes is assumed. For the three years 1968 to 1970 when individual tests (tare lab) were made of beets for processing at Chaska, individual test of sugar content averaged 0.48 percent above sugar content in cossettes. In recent years for U.S. sugar beet areas, the weighted average sucrose content upon which payments to producers are based has run 0.2 to 0.4 percent higher than sucrose in cossettes.2/

1/ Sugarbeet Program, ASCS Handbook 1-SU (Revision 6), Exhibit 19, rates applicable to the 1971 crop.
2/ Sugar Statistics and Related Data, Volume II (Revised), Statistical Bulleting No. 244, ASCS, USDA, 1969, Table 6.

Table 11.--Assumptions of association debt, beet payments, and retains for three producer payment plans

Payment situation	Association debt	Basic payment	Per unit retain	Patronage refund Retained	Patronage refund Cash	Cash payment	Cash payment represents Year
	Million dollars			Dollars per ton			
"Residual" approach - zero net savings:							
1 (a)	23.3	18.85	2.84	-	-	16.01	1st year
1 (b)	33.8	17.58	3.77	-	-	13.81	1st year
Retain and zero net savings:							
2 (a)	23.3	19.84	2.00	-	-	17.84	12 year average
2 (b)	33.8	19.04	2.14	-	-	16.90	12 year average
Competitive payment:							
3 (a)	23.3	15.75	2.00	3.27	.82	14.57	12 year average
3 (b)	33.8	15.75	2.00	2.63	.66	14.41	12 year average

Production Costs and Yields

Production costs for sugar beets and alternative crops and yields for the alternative crops typical t- the seven county area were taken from a study completed by the Department of Agricultural Economics, University of Minnesota.[3/]

We placed the seven counties into two areas on the basis of soil type and climate conditions. The eastern area includes Kandiyohi, Redwood, Renville, and Sibley counties. The western area includes Chippewa, Swift, and Yellow Medicine counties. The study by the Department of Agriculture Economics included three additional counties in the western area and 14 additional counties in the eastern area which are not expected to grow beets for the proposed plant. Therefore, costs and yields may not apply as precisely to the seven beet counties as would be implied by their use in this report.

Production costs and yields are primarily those for a representative farm in an area. Cost for sugar beets reflect the chemical, mechanical and electronic technology that might be applied in or soon after 1975, thus replacing migrant labor for hand hoeing and thinning. Production costs with migrant labor are about $25 per acre higher than with the mechanical technology. Beet hauling costs reflect a charge of 3.75 cents per ton mile for beets from those producers signed up with Southern Minnesota Beet Growers Association in May 1972.

[3/]   Johnson, R.L.; Jensen, H.R.; Boisvert, R.N.; Sugar Beet Supply Response of Southern Minnesota Growers to Varying Sugar Beet Prices: A Report to WM-51.

Production cost data reflect costs in 1966 updated by applying the SRS reported index of prices paid (1966-67 = 100) for March 1972 as follows:

Fertilizer	101
Pesticides	114
Seed	123
Machinery (fixed cost)	129
Machinery supplies	112
Hauling and storage	115 (FCS estimate)

Machine costs for all crops may be underestimated due to an assumption of extensive use during the life of the equipment. New beet producers, in particular, would have higher cash outlays for equipment because loan repayments would be higher than the depreciation allowances used in these budgets.

The University of Minnesota provided hours of labor worked rather than a labor cost. The U.M. study assumed that operator labor, family labor, and hired labor would all be utilized and each would be charged at different prices. We charged $2 per hour as a labor expense in the crop budgets to facilitate the reader's comparison of returns for each crop.

To reflect income from participation in the feed grain program we created a "crop" on diverted acreage. It is a cover crop of oats with associated costs of seed, seed bed preparation and planting. The set-aside payments are currently calculated on one-half of the feed grain base times the farm yield times the payment per bushel. The gross return per diverted acre shown in Table 12 is twice the amount which the reader might conclude as correct from the assumptions shown in the same table. This is because one-half of the feed grain base is twice the required minimum diversion of 25 percent of the base. By assuming that 25 percent of the total feed grain base is set-aside, and that corn for grain is produced on the remaining 75 percent of the base, we have combined one-third of the net return for diverted acreage with the net return from corn for comparison with the return from sugar beets as shown in Table 16.

Sugar beet yields are based on production that occurred two or more years from 1966 through 1971 for those experienced producers who signed agreements with Southern Minnesota Beet Growers Association in 1972. Sugar beet tonnage per acre applied in the crop budgets are as follows:

County	Tons per acre
Renville	15.4
Chippewa	16.0
Sibley	14.0
Swift	14.4
Seven county area	15.6

Table 12.--Crop budgets applicable to selected areas of Minnesota

Item	Diverted acreage	Eastern area				Western area				
		Corn	Soybeans	Wheat	Oats	Corn	Soybeans	Wheat	Oats	Flaxseed
		Dollars per acre								
Costs:										
Fertilizer	-	18.01	3.38	7.37	7.47	11.62	-	5.49	5.84	2.33
Pesticides	1.00	10.94	7.24	.48	.48	14.43	-	.48	.48	1.32
Seed	1.50	4.06	5.68	5.03	5.79	4.06	5.68	5.03	5.79	4.45
Machinery - fixed cost	4.25	9.51	6.97	6.30	6.78	9.51	6.97	6.30	5.75	5.75
Machinery - repair & supply	2.75	6.54	4.65	4.10	4.52	6.54	4.65	4.10	6.60	6.60
Drying, storage, hauling	-	16.02	3.17	.88	1.10	12.52	2.36	.88	.91	.29
Labor	4.00	4.10	3.30	2.84	3.24	4.10	3.30	2.84	2.78	2.80
Total cost	13.50	69.18	34.39	27.00	29.38	62.78	22.96	25.12	28.15	23.54
Gross return	88.00	111.10	88.40	66.15	50.15	90.90	65.00	66.15	41.30	45.54
Net return to land and management	74.50	41.92	54.01	39.15	20.77	28.12	42.04	41.03	13.15	22.00
Assumptions:										
Price per bushel	.40	1.01	2.60	1.89	.59	1.01	2.60	1.89	.59	2.53
Yield per acre - bushels	110	110	34	35	85	90	25	35	70	18

The University of Minnesota obtained yield estimates for the other crops from county and state extension specialists in 1966.

Equity Capital

Sugar beet producers have promised to invest $100 per acre to help finance the beet processing plant. We assume that $95 of this amount must be borrowed in early 1973. The repayment of a seven year PCA loan of $100 ($5 for a share in the PCA) might involve an eight percent interest payment at the end of the first year with principal payments beginning after two years following income from a 1974 beet crop. With principal paid in six equal amounts, annual payments including interest might range from $24.67 in the second year to $17.98 for the last year. The second year payment is given in the crop budget to better show amounts remaining after all outlays for the sugar beet operation are accounted for.

Retain Taxation

The association acquires capital through growers' investments in per unit capital retains and patronage refunds. The invested amounts belong to the producer and are part of his income in the year in which they are allocated to him. We added these amounts to his taxable income. The combined state and federal tax outlay shown in the sugar beet crop budget represents a 30 percent payment rate on the amount retained by the association.

Returns Per Acre

Tables 13 through 15 project sugar beet costs and returns under the various assumptions discussed in the preceding sections of this report. We remind readers of this report that situations 1 (a), 2 (a), and 3 (a) describe a "low" debt situation and that situations 1 (b), 2 (b), and 3 (b) describe a "high" debt situation.

Net returns to land and management for sugar beets exceeded returns from alternative crops as shown in Table 16. Under the competitive payment situation 3 (b), returns for sugar beets range above returns for corn by $23 in Sibley County to $71 in Chippewa County with an average for the seven county area of possibly $58.

Failure to meet the many assumptions supporting these returns could quickly erode the margin beets display over corn. For example the use of migrant labor might reduce returns by $25 per acre. Failure to install a reimbursement allowance for hauling would place a large strain on returns for producers most distant from the plant. An adverse effect of these two factors together would place returns to sugar beets and corn on about the same level in Sibley and Swift Counties.

Table 13.--Sugar beet crop budget for selected areas of Minnesota assuming 1975
technology and beet payment situation 1 (a) and 1 (b)

Item	County				Seven
	Renville	Chippewa	Sibley	Swift	county area
	-	-	Dollars per acre	-	-
Costs:					
Fertilizer	28.48	28.48	28.48	28.48	28.48
Pesticides	18.42	18.42	18.42	18.42	18.42
Seed	3.94	3.94	3.94	3.94	3.94
Machinery - fixed cost	10.76	10.76	10.76	10.76	10.76
Machine repair & supplies	10.99	10.99	10.99	10.99	10.99
Harvest loading	1.54	1.60	1.40	1.44	1.56
Hauling	9.82	16.80	17.85	27.00	13.58
Labor	11.82	11.82	11.82	11.82	11.82
Subtotal--production cost	95.77	102.81	103.66	112.85	99.55
Association equity loan payment	24.67	24.67	24.67	24.67	24.67
Tax on capital retain	13.12	13.63	11.93	12.27	13.29
Total outlay	133.56	141.11	140.26	149.76	137.51
Returns--situation 1 (a):					
Sugar beets ($16.01/ton)	246.55	256.16	224.14	230.54	249.76
Sugar Act payment	32.09	33.34	29.18	30.01	32.51
Hauling reimbursement	-	4.80	7.35	16.20	1.88
Total return	278.64	294.30	260.67	276.75	284.15
Net return to land and management	145.08	153.19	120.41	126.99	146.64
Returns--situation 1 (b):					
Sugar beets ($13.81/ton)	212.67	220.96	193.34	198.86	215.44
Sugar Act payment	32.09	33.34	29.18	30.01	32.51
Hauling reimbursement	-	4.80	7.35	16.20	1.88
Total return	244.76	259.10	229.87	245.07	249.83
Total outlay	137.86	145.58	144.16	153.78	141.86
Net return to land and management	106.90	113.52	85.71	91.29	107.97

Table 14.--Sugar beet crop budget for selected areas of Minnesota assuming 1975 technology and beet payment situation 2 (a) and 2 (b)

Item	County				Seven county area
	Renville	Chippewa	Sibley	Swift	
	Dollars per acre				
Costs:					
Fertilizer	28.48	28.48	28.48	28.48	28.48
Pesticides	18.42	18.42	18.42	18.42	18.42
Seed	3.94	3.94	3.94	3.94	3.94
Machinery - fixed cost	10.76	10.76	10.76	10.76	10.76
Machine repair & supplies	10.99	10.99	10.99	10.99	10.99
Harvest loading	1.54	1.60	1.40	1.44	1.56
Hauling	9.82	16.80	17.85	27.00	13.58
Labor	11.82	11.82	11.82	11.82	11.82
Subtotal production cost	95.77	102.81	103.66	112.85	99.55
Association equity loan payment	24.67	24.67	24.67	24.67	24.67
Tax on capital retain	9.24	9.60	8.40	8.64	9.36
Total outlay	129.68	137.08	136.73	146.16	133.58
Returns--situation 2 (a):					
Sugar beets ($17.84/ton)	274.74	285.44	249.76	256.90	278.30
Sugar Act payment	32.09	33.34	29.18	30.01	32.51
Hauling reimbursement	-	4.80	7.35	16.20	1.88
Total return	306.83	323.58	286.29	303.11	312.69
Net return to land and management	177.15	186.50	149.56	156.95	179.11
Returns--situation 2 (b):					
Sugar beets ($16.90/ton)	260.26	270.40	236.60	243.36	263.64
Sugar Act payment	32.09	33.34	29.18	30.01	32.51
Hauling reimbursement	-	4.80	7.35	16.20	1.88
Total return	292.35	308.54	273.13	289.57	298.03
Total outlay	130.33	137.75	137.32	146.76	134.24
Net return to land and management	162.02	170.79	135.81	142.81	163.79

Table 15.--Sugar beet crop budget for selected areas of Minnesota assuming 1975
technology and beet payment situation 3 (a) and 3 (b)

Item	County				Seven county area
	Renville	Chippewa	Sibley	Swift	
	-	-	Dollars per acre	-	-
Cost:					
Fertilizer	28.48	28.48	28.48	28.48	28.48
Pesticides	18.42	18.42	18.42	18.42	18.42
Seed	3.94	3.94	3.94	3.94	3.94
Machinery - fixed cost	10.76	10.76	10.76	10.76	10.76
Machine repair & supplies	10.99	10.99	10.99	10.99	10.99
Harvest loading	1.54	1.60	1.40	1.44	1.56
Hauling	9.82	16.80	17.85	27.00	13.58
Labor	11.82	11.82	11.82	11.82	11.82
Subtotal production cost	95.77	102.81	103.66	112.85	99.55
Association equity loan payment	24.67	24.67	24.67	24.67	24.67
Tax on capital retain	24.35	25.30	22.13	22.77	24.66
Total outlay	144.79	152.78	150.46	160.29	148.88
Returns--situation 3 (a):					
Sugar beets (14.57/ton)	224.38	233.12	203.98	209.81	227.29
Sugar Act payment	32.09	33.34	29.18	30.01	32.51
Hauling reimbursement	-	4.80	7.35	16.20	1.88
Total return	256.47	271.26	240.51	256.02	261.68
Net return to land and management	111.68	118.48	90.05	95.73	112.80
Returns--situation 3 (b):					
Sugar beets ($14.41/ton)	221.91	230.56	201.74	207.50	224.80
Sugar Act payment	32.09	33.34	29.18	30.01	32.51
Hauling reimbursement	-	4.80	7.35	16.20	1.88
Total return	254.00	268.70	238.27	253.71	259.19
Total outlay	141.83	149.70	147.78	153.72	145.89
Net return to land and management	112.17	119.00	90.49	99.99	113.30

Table 16.--Net return per acre to land and management for sugar beets and alternative crops in selected counties of Minnesota

Area and crop	Alternative crops	Net return to land and management Beet payment situation [1]					
		1 (a)	1 (b)	2 (a)	2 (b)	3 (a)	3 (b)
		- - - Dollars per acre - - -					
Eastern area:							
Sugar beets:							
Renville County	-	145	107	177	162	112	112
Sibley County	-	120	86	150	136	90	90
Corn	67	-	-	-	-	-	-
Soybeans	54	-	-	-	-	-	-
Wheat	39	-	-	-	-	-	-
Oats	21	-	-	-	-	-	-
Western area:							
Sugar beets:							
Chippewa County	-	153	114	186	171	118	119
Swift County	-	127	91	157	143	96	100
Corn	48	-	-	-	-	-	-
Soybeans	42	-	-	-	-	-	-
Wheat	41	-	-	-	-	-	-
Oats	13	-	-	-	-	-	-
Flaxseed	22	-	-	-	-	-	-
Seven county area:							
Sugar beets	-	147	108	179	164	113	113

1/ See Table 11 for amount of beet payment.

Returns Compared for Representative Farms

Returns for farms with differing crop and livestock enterprises in South Central Minnesota were prepared expecially for this report by Mr. William S. Penning, Area Extension Agent, Farm Management, and Dr. Charles H. Cuykendall, Extension Economist, Farm Management, of the University of Minnesota.

An example farm was chosen to explain most of the management decisions the farmer has to make when selecting crop and livestock enterprises to best utilize his set of resources. Comparison is made to a basic farm unit, farm number 1 in the following tables, by selecting alternative systems of farming as shown for farms number 2 through 7. As many things as possible were held constant to express the competitive position between the sugar beet enterprise and other enterprises typical to the area such as corn, soybeans, hogs, and beef feeding. A data bank developed by the Farm Management Specialists at the University supplied much of the information used in the various crop and livestock enterprises.

Sugar beet production in these examples incorporate a hand labor expense for once over the beets. This differs from the previous section on per acre costs which assume a level of technology that eliminates the need for hand labor.

The presentation of returns in this report differs from the University's format for its reports on farm enterprise alternatives. For example, we show an outlay for the repayment of the principal on outstanding loans. The amounts shown for family living are residual We assume that equity in the beet processing facility has been borrowed and repaid as discussed in the preceding section. We assume a 7 year repayment period for loans used to purchase machinery and facilities depreciated in 10 years or less, and 20 year repayment period on loans for facilities depreciated over 30 years.

Following receipt by Farmer Cooperative Service of the farm enterprise data from the University of Minnesota, we made income adjustments for those farms producing beets. Increased outlays for taxes were approximated manually, and therefore are not as precise as they would be if determined by the tax rates in the University's computer.

The example farm is operated by a 40 year old farmer who has a wife and three children. The operator was in partnership with his father for ten years and has been on his own for a similar time. He rents 300 acres of cropland from his father. The cash rental rate is $25 per crop acre. The father lives on this place. Ten years ago the operator rented his uncle's farm, which is also a similar 300 acres of loam soil cropland.

Four years ago the operator bought the uncle's farm for $160 per crop acre on a contract for deed. The uncle didn't need immediate money and required no down payment. The contract was written at 6 percent with an annual ammortized payment of $3,450. This farm is presently valued at $175 per crop acre ($52,500 total) and the present debt is paid down to $45,000 the end of this year.

The machinery line is designed to do the job on the present 600 acres. The oldest son, who is interested in farming or other family labor is available to use the second tractor and to haul grain. Plowing and combining are the operations that are most likely to be troublesome if poor weather slows field work. The original cost of the machinery is $60,000 and a present depreciated value of $36,000. Machinery is the main security on a loan of $31,500 at the major lender as an open end chattel loan at 8 percent interest.

The principal payments the operator expects to make on his $76,500 debt are $6,119. The contract for deed will pay off in 27 years and the machinery debt would pay off in 5 years if no replacement machines were added.

The farm as presently operated is a cash grain farm with no live-stock. The operator and his son are both interested in feeding beef calves and producing hogs, but are also thinking of expansion in corn and/or sugar beet production. The present land use is 150 acres of soybeans, 350 acres of corn for grain, 50 acres of oats and 50 acres of idle land set aside under the feed grain program for which he receives a payment of $3,000. The 50 acre set aside implies a 200 acre feed grain base. Program participants were permitted to plant additional acreage to corn in 1971, thus accounting for the higher corn acreage in this basic farm. These and other assumptions for farm 1 and the returns appear in Tables 17 through 20.

The operator wants to compare enterprise combinations from different farming systems using constant yields, prices and direct costs. One alternative is to replace soybeans with sugar beets (farm number 2 shown in Table 21). The sugar beets require a major change in machinery because of the additional power requirements for the beet production and hauling machinery needed. The operator expects to spend $22,500 for replacement and additional machinery for 150 acres of sugar beets. The harvesting machinery will be shared with another beet grower. The direct costs of raising sugar beets are seed, fertilizer, chemicals and hired labor by contract for which a total of $60 is charged. Repayment of an assumed loan for the $100 per acre of beets for equity in the association has been included in outlays for interest and principal. Capital retained by the association was included in taxable income.

Table 17.--Land use assumptions for Minnesota farms

Crop	Farm number						
	1	2	3	4	5	6	7
				Acres			
Corn	350	350	350	310	350	350	550
Soybeans	150	-	150	75	150	100	100
Sugar beets	-	150	-	-	150	200	-
Oats	50	50	50	50	50	50	50
Alfalfa	-	-	-	50	-	-	-
Corn silage	-	-	-	65	-	-	-
Set aside	50	50	50	50	50	50	50
Total crop acres	600	600	600	600	750	750	750

Table 18.--Livestock and labor use assumptions for Minnesota farms

Item	Unit	Farm number						
		1	2	3	4	5	6	7
Livestock	Number	-	-	50 hogs	375 calves	-	-	-
Manager labor	Man-year	1	1	1	1	1	1	1
Hired men	Man-year	-	1	1	1	1	1	-
Contract labor	1/	-	1	-	-	1	1	-

1/ One time over sugar beets.

Table 19.--Direct costs per acre, yield, and feed requirements for alternative farms in Minnesota

Item	Corn	Oats	Corn silage	Alfalfa	Sugar beets	Soybeans	Set aside	Complete hogs	Feeding beef calves
Direct expense	$29.00	$4.00	$25.00	$13.00	$60.00	$16.00	$3.00	$229.00	$202.50
Interest on direct	$ 1.50	$ .25	$ 2.00	$ 1.00	$ 4.75	$ .75	$ .25	$ 9.25	$ 13.00
Yield	95 bu.	65 bu.	18 ton	3-½ ton	15.6 ton	26 bu.	-	15 pigs	675# gain
Unit price	$ 1.05	$ .517	-	-	1/	$ 2.65	-	$21 pigs	2/
Feed required corn	-	-	-	-	-	-	-	215 bu.	60 bu.
Feed required forage	-	-	-	-	-	-	-	-	1-½ ton

1/ See Table 11 for cash payment rates.
2/ Feeder calves bought at $39.50 per cwt. and sold at $3C.50 per cwt.

Table 20.--Summary of profitability for farms without sugar beets

Item	Farm number			
	1	3	4	7
Cropped acres	600	600	600	750
Farm investment	$ 132,000	$ 173,250	$ 171,500	$ 147,000
Farm debt	76,500	117,750	116,000	91,500
Gross farm income[1]	49,928	73,040	141,221	66,433
Operating expense excluding interest	28,700	46,150	110,198	39,100
Net cash income	21,228	26,890	31,024	27,333
Depreciation	6,000	7,932	8,193	7,500
Return to labor, management, capital	15,228	18,958	22,831	19,833
Interest paid	6,831	10,953	15,271	8,464
Return to labor, management, equity	8,397	8,005	7,560	11,369
Capital invested in Association	-	-	-	-
Repayment ability:				
Return to labor, management, equity	8,397	8,005	7,560	11,369
Depreciation	6,000	7,932	8,193	7,500
Total available funds	14,397	15,937	15,753	18,869
Use of funds:				
Principal payment	6,119	9,846	9,904	8,262
Taxes (Federal, State, and Social Security)	1,367	903	1,104	2,253
Family living	$ 6,911	$ 5,188	$ 4,745	$ 8,354

1/ Includes $3,000 payment for feed grain program.

Table 21.--Summary of profitability for farm number 2 under various beet payment situations

Item	Beet payment situation 1/					
	1 (a)	1 (b)	2 (a)	2 (b)	3 (a)	3 (b)
Cropped acres	600	600	600	600	600	600
Farm investment	$ 169,500	$ 169,500	$ 169,500	$ 169,500	$ 169,500	$ 169,500
Farm debt	114,000	114,000	114,000	114,000	114,000	114,000
Gross farm income 2/	82,215	77,067	86,496	84,298	78,845	78,471
Operating expense excluding interest	41,846	41,846	41,846	41,846	41,846	41,846
Net cash income	40,369	35,221	44,650	42,452	36,999	36,625
Depreciation	8,250	8,250	8,250	8,250	8,250	8,250
Return to labor, management, capital	32,119	26,971	36,400	34,202	28,749	28,375
Interest paid	10,924	10,924	10,924	10,924	10,924	10,924
Return to labor, management, equity	21,195	16,047	25,476	23,278	17,825	17,451
Capital invested in Association	6,646	8,822	4,680	5,008	12,332	10,834
Repayment ability:						
Return to labor, management, equity	21,195	16,047	25,476	23,278	17,825	17,451
Depreciation	8,250	8,250	8,250	8,250	8,250	8,250
Total available funds	29,445	24,297	33,726	31,528	26,075	25,701
Use of funds:						
Principal payment	11,834	11,834	11,834	11,834	11,834	11,834
Taxes (Federal, State, and Social Security)	8,589	7,331	9,621	8,807	9,622	8,777
Family living	$ 9,022	$ 5,132	$ 12,271	10,887	$ 4,619	$ 5,090

1/ See Table 11 for amount and allocation of payment.
2/ Includes $3,000 payment for feed grain program.

The sugar beets increased the return to labor, management, and equity by $9,054 for payment plant 3 (b) compared to the basic farm. Following payment of debt and taxes, however, $1,821 less is available for family living with sugar beets under payment plan 3 (b).

In farm number 3 the operator considers his income potential from adding 50 sows to his basic cash grain farm. Sugar beets are not included. He expects the sows to farrow twice a year and to produce 15 pigs per sow unit. He will cull after 4 litters and will use 215 bushels of corn for each sow unit along with supplement as needed. He expects to spend $35,000 on buildings and equipment, 1/3 depreciated in 10 years and 2/3 depreciated in 30 years, and purchase $6,250 worth of breeding stock. He will not be changing his crop rotation but expects his expenses to increase due to costs in hog production. He plans on $4,500 increase in labor costs, $1,400 increase in repair, utilities and insurance and $100 increase in general farm expense. In addition, he will incur the direct costs of raising hogs like feed, veterinary, medical, breeding, etc.

Farm 4 is an analysis of a beef feeding enterprise of 375 head. The operator would be feeding steer calves from 425 pounds to around 1,100 pounds. He expects the feed cost to be 16.5¢ per pound of gain and is projecting a 3 percent death loss. He expects to feed 1.5 tons of corn silage and 60 bushels of corn per head with supplement to balance the ration. He would plan to spend $30,000 for the feedlot, with 1/3 de-

preciated in 10 years and 2/3 depreciated in 30 years and also expects
to buy $9,500 worth of forage tools to make hay and silage. The gross
income went up considerably, however, the purchase price of the feeder
is deducted as a direct cost.

Compared to the basic cash grain farm, the hog and livestock enter-
prises did not give a higher return to labor, management, and equity,
as did farm 2 with sugar beets. This is because the input-output data
used puts cash grain, hogs, and beef feeding on a highly competitive
level with no distinct advantage for either system. The cost and yield
data for these alternatives is on a breakeven profit margin. While the
hogs and feeder calves didn't improve the profit position for the farm,
they and the sugar beets did generate enough labor income to allow a
$4,500 salary for the oldest son.

There are other enterprise combinations based on more acreage which
will make the basic farm more profitable. Another sugar beet alternative
is to continue the crop rotation in the basic farm and rent an additional
150 acres of crop land for sugar beets, as shown for farm number 5 in
Table 22. The operator expects to increase related operating expense
by $11,625 over the basic farm and invest a similar $22,500 in beet
machinery as was done for farm number 2.

Table 22.--Summary of profitability for farm number 5 under various beet payment situations

Item	Beet payment situation 1/					
	1 (a)	1 (b)	2 (a)	2 (b)	3 (a)	3 (b)
Cropped acres	750	750	750	750	750	750
Farm investment	$ 184,500	$ 184,500	$ 184,500	$ 184,500	$ 184,500	$ 184,500
Farm debt	129,000	129,000	129,000	129,000	129,000	129,000
Gross farm income 2/	92,549	87,401	96,830	94,632	89,179	88,805
Operating expense excluding interest	49,646	49,646	49,646	49,646	49,646	49,646
Net cash income	42,903	37,755	47,184	44,986	39,533	39,159
Depreciation	9,750	9,750	9,750	9,750	9,750	9,750
Return to labor, management, capital	33,153	28,005	37,434	35,236	29,783	29,409
Interest paid	12,561	12,561	12,561	12,561	12,561	12,561
Return to labor, management, equity	20,592	15,444	24,873	22,675	17,222	16,848
Capital invested in Association	6,646	8,822	4,680	5,008	12,332	10,834
Repayment ability:						
Return to labor, management, equity	20,592	15,444	24,873	22,675	17,222	16,848
Depreciation	9,750	9,750	9,750	9,750	9,750	9,750
Total available funds	30,342	25,194	34,623	32,425	26,972	26,598
Use of funds:						
Principal payment	13,976	13,976	13,976	13,976	13,976	13,976
Taxes (Federal, State, and Social Security)	8,334	6,915	9,345	8,552	9,345	8,521
Family living	$ 8,032	$ 4,303	$ 11,302	$ 9,897	$ 3,651	$ 4,101

1/ See Table 11 for amount and allocation of payment.
2/ Includes $3,000 payment for feed grain program.

Farm number 6 in Table 23 is an alternative to grow 200 acres of sugar beets without spending more than the $22,500 for beet machinery which was needed for 150 acres. In the latter, beet harvest machinery was shared with a neighbor. This larger sugar beet acreage produces 406.38 tons of sugar raw value, thus causing some reduction in the base rate of payment under the Sugar Act. The first 349 tons receive payment at the rate of $16 per ton while the remaining 57.38 tons receive payment at the rate of $15 per ton.

Farm 7 strives to increase income by increasing corn acreage primarily by renting the additional 150 crop acres for $4,500, and excluding sugar beets. Compared to the basic farm, labor hours are raised only 750 hours, while other expansions created a two man farm requiring $4,500 extra labor. An investment of $15,000 would be required for additional equipment for this expansion of corn acreage.

These last three alternatives increase the projected profitability from $8,397 to over $24,000 for beet payment plan 3 (b). The residual amount for family living from the beet producing farms decreases, however, below that for the basic farm 1 and farm 7 as shown in Table 24.

Table 23.--Summary of profitability for farm number 6 under various beet payment situations

Item	Beet payment situation 1/					
	1 (a)	1 (b)	2 (a)	2 (b)	3 (a)	3 (b)
Cropped acres	750	750	750	750	750	750
Farm investment	$ 189,000	$ 189,000	$ 189,000	$ 189,000	$ 189,000	$ 189,000
Farm debt	134,000	134,000	134,000	134,000	134,000	134,000
Gross farm income 2/	103,312	96,448	109,020	106,088	98,818	98,320
Operating expense excluding interest	51,353	51,353	51,353	51,353	51,353	51,353
Net cash income	51,959	45,095	57,667	54,735	47,465	46,967
Depreciation	9,750	9,750	9,750	9,750	9,750	9,750
Return to labor, management, capital	42,209	35,345	47,917	44,985	37,715	37,217
Interest paid	13,161	13,161	13,161	13,161	13,161	13,161
Return to labor, management, equity	29,048	22,184	34,756	31,824	24,554	24,056
Capital invested in Association	8,861	11,762	6,240	6,677	16,442	14,446
Repayment ability:						
Return to labor, management, equity	29,048	22,184	34,756	31,824	24,554	24,056
Depreciation	9,750	9,750	9,750	9,750	9,750	9,750
Total available funds	38,798	31,934	44,506	41,574	34,304	33,806
Use of funds:						
Principal payment	14,810	14,810	14,810	14,810	14,810	14,810
Taxes (Federal, State, and Social Security)	13,352	11,393	14,944	13,704	14,945	13,656
Family living	$ 10,636	$ 5,731	$ 14,752	$ 13,060	$ 4,549	$ 5,340

1/ See Table 11 for amount and allocation of payment.
2/ Includes $3,000 payment for feed grain program.

Table 24.--Returns for farms with and without sugar beets

Farm number and payment plan	Beet acreage	Return to labor, management, and equity	Family living
	Acres	- - Dollars	- -
1	-	8,397	6,911
2 - 1 (a)	150	21,195	9,022
1 (b)	150	16,047	5,132
2 (a)	150	25,476	12,271
2 (b)	150	23,348	10,887
3 (a)	150	17,825	4,619
3 (b)	150	17,451	5,090
3	-	8,005	5,188
4	-	7,560	4,745
5 - 1 (a)	150	20,592	8,032
1 (b)	150	15,444	4,303
2 (a)	150	24,873	11,302
2 (b)	150	22,745	9,897
3 (a)	150	17,222	3,651
3 (b)	150	16,848	4,101
6 - 1 (a)	200	29,048	10,636
1 (b)	200	22,184	5,731
2 (a)	200	34,756	14,752
2 (b)	200	31,918	13,060
3 (a)	200	24,554	4,549
3 (b)	200	24,056	5,340
7	-	11,369	8,354

Findings

Based on the assumptions applied in this study sugar beets provide increased returns to land and management varying from 23 to 148 percent over corn when measured on a per acre basis (Table 16), and increased returns to labor, management, and equity ranging from 48 to 112 percent over farms of the same acreage which did not produce beets when measured on a farm enterprise basis under sugar beet payment plan 3 (b) (Table 24). This favorable picture for the producer was reversed after deducting his outlays for principal repayment on outstanding loans and taxes. His residual income available for family living was less when producing sugar beets than the amount available from farms of comparable acreage producing cash grain or swine which excluded beets (Table 24).

The seemingly low amount for family living has considerable potential to increase for farms producing sugar beets as amounts paid for interest and principal decrease. We may assume, for example, that in the eighth year of operation, loans for farm machinery and for the producer equity in the association are fully paid, that no replacement machinery is added, that machinery depreciation allowances continue based on a 10 year schedule, and that tax rates and exemptions are unchanged. Beginning in the eighth year therefore, the allowance for family living on the basic farm would be $17,391 and under sugar beet payment plan 3 (b) the amount available for family living would be $20,534 for farm 2, $22,542 for farm 5 and $24,147 for farm 6.

We have read with interest the excellent Agricultural Economics Report No. 87, "Projections of Grower Returns from a Cooperative Sugar Beet Processing Plant," issued by North Dakota State University in 1972. A couple of rather significant differences between the assumptions used in the North Dakota report and in our report are worth noting.

First, because the North Dakota report's projected cost and returns represent sugar beet production on fallowed land, total returns to operator's labor and management were divided by two to indicate the returns per acre. Our report is based on sugar beet production in an area where such production will be continuous every year.

Secondly, the North Dakota study used an average yield of 12.5 tons per acre as a factor for deriving gross income. Our study uses 15.6 tons per acre based in part on 5 year averages of sign-up growers with actual production histories. Our analysis also projects costs and returns of sugar beets and alternative crops within different sections of the area to be served by the proposed plant.

There are obviously other cost differences between the production areas and different procedures and approaches in handling these and related data. But these 2 points of difference--everything else being equal--produce 124 percent greater returns to Southern Minnesota growers than returns projected for North Dakota growers.

RECOMMENDATIONS

(1) If the association adopts the so-called residual approach in making returns to producers, that is, makes a per unit capital retain equivalent to the amount required to pay off term loans and investments of the bank for cooperatives "C" stock, we suggest that an additional 25 cents per ton be added to the retain to provide funds for additional capital purposes arising from plant expansion requirements that inevitably are required from time to time.

(2) If the association adopts a flat per unit retain policy with the intent that a portion of depreciation charges be used as a source of funds for term loan payments, we suggest that its working capital position be protected by establishing the retain in an amount that assures a $4 million net working capital position. Under a maximum debt/net worth situation (around $33.8 million) the per unit capital retain should be at least $2.25 per ton delivered.

(3) If the association adopts a policy of paying the "competitive price" for beets we suggest that it maintain a $2 per ton per unit capital retain and that it pay not more than 20 percent of its patronage refunds in the form of cash.

(4) Taking into account the estimated cash outlays growers make in growing beets, variously estimated at from $6.50 to $7.50 per ton, we suggest that the first advance to growers should not exceed 60 percent of the projected competitive price and that the growers total investment in per unit capital retains be made by a deduction from the first advance.

(5) At this writing the financing package for the project has not been completed. The gap in basic long-term financing between the initial approximately 5 million of equity capital committed in connection with the membership sign-up and the estimated $23 million long-term loan from the St. Paul Bank for Cooperatives has not been plugged. The amount in question is around $10 million. Our projections include an alternative projecting this amount as a secondary loan payable in 15 years at 9 percent interest. Perhaps more complicated arrangements can be made that could involve for example, the primary contractor's participation in a lease arrangement, guarantee arrangements by other banking institutions or insurance companies, and other combinations of arrangements. The association should carefully evaluate all such arrangements in terms of their implications with respect to the impacts on the financial condition of the association, the ultimate effect on economic benefits flowing to producers, their effects on management control, and the extent and nature of risks shifted to or from the association to the respective participants.

(6) Initial out-of-pocket equity capital investments of growers in the capital structure of the association range from around $2,000 to $60,000. Lending institutions involved in financing other cooperative sugar processing operation--both cane and sugar beets--have in many cases required written assurance from local banks and production credit associations that they stand ready, willing, and able to make loans to the

cooperatives' members to finance growers equity capital commitments as well as the production inputs, including machinery and related equipment, for the total farm operation. The association should have a backlog of potential grower members in the same general area to plug membership gaps as slippage occurs as a result of inadequate grower financing arrangements or for other reasons.

(7) The association should use the services of an experienced sugar-plant engineer on a consulting basis to evaluate detailed plans that the plant construction firm ultimately will prepare. His efforts may or may not result in cost savings or improved efficiency. More importantly his efforts should generate confidence of all concerned that the plant can do the job within the design parameters.

Appendix Table 1.--Estimated costs based on 750,000 tons delivered to plant

Item .	Cost	Source and alternative
	Dollars	
Beet procurement costs:		
Fixed agricultural expenses (F):		
Salaries of agriculturist & field men ⎫		
Field staff auto expense ⎬		
Research, seed, contract work ⎭	152,500	Source 1 and 4
Transportation (FB):		
Hauling charges from piling stations	-	Source 2 - Alternative $1\frac{1}{}$
Hauling allowances	155,349	Source 2 - Alternative $1\frac{1}{}$
Freight-in on beets	-	
Receiving beets (FB):		
Equipment, power and maintenance	48,000	Source 4
Labor operating receiving station	-	Source 2 - Alternative 1
Beet piling and reloading	79,289	Source 1 - Alternative $1\frac{2}{}$
Beet laboratory and tare room	18,605	Source 1
Total receiving costs	145,894	
Total procurement costs	453,743	
Factory operations:		
Factory supplies (FS):		
Fuel (lignite) @ 5.50/ton delivered	730,710	Source $1\frac{3}{}$
Coke	112,500	Source 1
Lime rock	187,500	Source 1
Sugar containers	-	
Filter fabrics	7,500	Source 1
Laboratory supplies	3,500	Source 4
Power - outside	-	
Factory chemicals	112,500	Source 1
Lubricants	30,000	Source 4
Other operating supplies	45,000	Source 1
Total factory supplies	1,229,210	
Factory labor (FS):		
(Includes factory supervision,		
laboratory, beet end, sugar end,		
warehouse, boiler and power house,		
lime kilh, mechanics, electricians,		
and all other factory duties)	788,744	Source 3
Factory intercampaign maintenance and		
repairs (F):		
Labor	79,360	Source 1
Materials	198,140	Source 1
Total factory intercampaign maintenance	277,500	
Total factory operations	2,295,454	
General overhead:		
Salaries (F):		
Officers, manager, and staff	84,360	Source 4
Superintendent, engineers, cashier,		
timekeeper, clerical help, store-		
room wages, and watchmen	195,000	Source 1
Total salaries	279,360	

Appendix Table 1.--Continued: Estimated costs based on 750,000 tons delivered to plant

Item	Cost	Source and alternative
	Dollars	
General overhead continued:		
Telephone and telegraph (F)	18,000	Source 4
Auto and travel (F)	12,000	Source 4
Insurance (F):		
Building)		
Equipment and machinery)	9,630	Source 1
Contents)		
Fidelity bonds)		
Other)	45,000	Source 4
Total insurance	54,630	
Taxes (F):		
State and local	480,000	Source 1
Depreciation (F):		
Building and equipment	1,225,226	45 yrs. on structure ($20,659,900) 18 yrs. on equipment ($13,790,100)
Social security (FICA) and unemployment taxes (FS):	116,807	9% of $1,202,946
Retirement plan costs (FS))		
Fringe benefits (FS):)		
Hospitalization)		
Group life insurance)	25,000	Estimate equivalent to 25% of FICA and F&SUTA
Total general overhead	2,211,023	

1/ Transportation	Hauling allowance	Piler to plant	Total
Alternative 1	155,349	-	$ 155,349
Alternative 2	76,823	223,283	300,106
Alternative 3	39,903	351,664	391,567
Alternative 4	32,184	383,636	415,820
Alternative 5	6,959	472,919	479,878
Alternative 6	7,692	562,808	570,500

2/ Receiving beets	Beet piling and reloading	Labor operating and receiving station	Total
Alternative 1	79,289	-	$ 79,289
Alternative 2	56,731	24,732	81,463
Alternative 3	44,441	37,098	81,539
Alternative 4	44,441	37,098	81,539
Alternative 5	33,499	49,463	82,962
Alternative 6	33,499	49,463	82,962

Appendix Table 1.--Continued

3/ Fuel and power cost:

Sugar production	$ 491,172
Pulp drying	205,875
Electric power	33,664
Total	$ 730,711

SOURCE: 1 - Refers to "Daily Manning and Labor Cost Estimates"
         2 - Refers to FCS transportation letter-report
         3 - Refers to BMA estimate
         4 - Other - confidential

KEY: FS - Fixed per bag of sugar
      FB - Fixed per ton of beets
      F - Fixed cost

June 5, 1972

Mr. Dale Ruebel, President
Southern Minnesota Beet
  Growers Association
Olivia, Minnesota 56353

Dear Mr. Ruebel:

This letter conveys initial results of our examination of potential
sugar beet production and processing plant location for the Southern
Minnesota Beet Growers Association. We are supplying these preliminary
results at this time because several weeks may pass before we complete
further analysis. We perceive you need to make decisions about whether
or not to solicit further signup and to maintain options on potential
plant sites.

PROJECTED PRODUCTION

In projecting production, we considered 307 producer agreements repre-
senting 49,178 acres. This included 139 agreements with recent beet
history and 168 agreements without beet history. We are defining a
producer agreement supported by beet history recorded with ASCS as
an experienced producer. Several individuals considered as new
producers, but with beet experience under another producer's account
were treated as inexperienced producers in this study. The yield
associated with the 307 producer agreements is 15.6 tons of beets
per acre.

Total average annual production is projected at about 767,000 tons of
beets. Crop size could vary from 738,000 to 795,000 tons two out of
three years, or from 710,000 to 823,000 tons nine out of every 10 years.

The potential fluctuation in crop size is based on the variation of
yields for those experienced producers who had beet crops during each
of the five years 1966 through 1970.

You may be interested in the basis for reaching this projection. Pro-
jected yields per acre for experienced sugar beet producers reflected
their individual yield for those years in which they produced beets
from 1966 through 1971. In most cases a simple average yield was
chosen. For 17 producers with substantial yield increases for the
most recent two or three crops, projected yields were increased by

amounts up to seven-tenths of one ton above their average. For 14
producers with a decreasing trend in yields or an unusually high yield
in one year, the projected yield was set lower than their average
yield.

Following consultation with County Extension Agents of Chippewa,
Renville and Redwood Counties, projected yield per acre for inexperi-
enced sugar beet producers were set near the average of experienced
producers mentioned above for their area or county as shown below:

County or area	Average yield for 139 experienced producers	Projected yield for 169 inexperienced producers
	Tons	Tons
Swift	14.4	14.4
Chippewa	116.0	16.0
Kandiyohi	--	16.0
Renville	15.4	--
N.E., (Rt. 16 east, Rt. 212 north)	14.7	15.0
Other Renville County	15.5	15.4
Sibley	13.8	14.0
Redwood	15.5	15.4

PLANT LOCATION

We considered your five potential plant sites near U. S. Highway 212
and a sixth site northeast of Clara City. A seventh site southwest
of Clara City was not included in the analysis, but would require
about the same amount of beet hauling as the site northeast of town.
The plant site two miles east of Renville provides for the least
hauling of beets from farm to plant, as shown in the following table:

Potential plant sites			Ton miles
Town	Township	Section	
Renville	Emmet	2-3	17,498,134
Olivia	Troy	11-12	17,952,126
Bird Island	Bird Island	10	18,896,672
Clara City	Rheiderland	5	21,556,559
Minn. Falls	Hawk Creek	4-5	21,747,785
Granite Falls	Granite Falls	35	23,984,029

Distance for each producer was measured -- on the map you provided -- from their home or base of operations along the most obvious route to each plant site.' For some producers one to four miles were added to permit travel over paved roads rather than long distances over gravel roads. All beets for one producer were considered to come from the same place without regard to location of rented land or whether owned land was contiguous.

This analysis indicates that the Granite Falls, Minnesota Falls and Clara City sites could be excluded as potential plant sites.

While the Renville site may provide the lowest cost for hauling beets, you may wish to consider other costs such as that for land, power lines, foundations and site preparation, and the like, before excluding the remaining potential sites at this time. At a minimum rate of 3.5 cents per ton mile for the 767,000 ton production level, the increased annual hauling cost compared to Renville is $15,890 for Olivia, $48,950 for Bird Island and $142,045 for Clara City.

We will follow up this preliminary report with similar analyses of potential piler station locations of from one to several such stations. Their number and location also may have an effect on whether the Renville site remains the most desirable.

Sincerely,

Phillip F. Brown
Agricultural Economist

David Volkin
Senior Agricultural Economist -
Organizational Specialist

UNITED STATES DEPARTMENT OF AGRICULTURE
FARMER COOPERATIVE SERVICE
WASHINGTON, D.C. 20250

July 13, 1972

Mr. Dale Ruebel, President
Southern Minnesota Beet
  Growers Association
Olivia, Minnesota 56358

Dear Mr. Ruebel:

This letter is a follow up to our June 5 letter. You will recall that
our findings indicated that the plant site two miles east of Renville
provides for the least hauling of beets from farm to plant. This letter
conveys costs and other information we found associated with 6 alter-
native locations for beet piling equipment. Of the 6 locations, 5 use
the Renville site for the processing plant site; alternative 6 uses the
Olivia site.

Table 1 indicates the lowest investment and total hauling costs occur
with all beets hauled direct to the plant at Renville. The use of each
additional piling station or change of plant location from Renville to
Olivia increases hauling costs over alternative 1 from 10 to 33 percent.

As you know, the cost of hauling beets must be borne by the beets whether
the immediate cost is paid by the grower or by the plant. By the same
token you have expressed a desire to pursue a policy of sharing beet
transportation costs between producers to minimize inequities between
producers at the extremes of distances from farm to pilers. One solution
would be to reimburse all producers hauling beets over 20 miles 3.75 cents
per ton mile for the distance over 20 miles. The estimated cost of such
subsidies for the producers affected under each alternative would be as
follows:

Alternative	Number of producers	Reimbursement for over 20 miles 1,000 Dollars
1	181	155
2	122	77
3	52	40
4	32	32
5	22	7
6	17	8

Table 1.--Southern Minnesota Beet Growers Association: Potential piler locations, related investment cost, and total hauling cost[1]/

Alternative	Plant site	Piling stations				Investment	Hauling cost
						1,000 Dollars	
1 No. pilers	Renville 6	X	X	X	X	1,275	656
2 No. pilers	Renville 4	Clara City 2	X	X	X	1,299	723
3 No. pilers	Renville 3	Clara City 2	X	Hector 1	X	1,316	742
4 No. pilers	Renville 3	Rt 13-277 1	Bunde 1	Hector 1	X	1,321	757
5 No. pilers	Renville 2	Rt 13-277 1	Bunde 1	Hector 1	Redwood 1	1,277	811
6 No. pilers	Olivia 2	Rt 13-277 1	Bunde 1	Hector 1	Redwood 1	1,297	875

1/ The Redwood station utilizes a single ramp piler. All other pilers are double ramp pilers.

The first alternative, while providing least investment cost and least cost for hauling beets, probably represents considerably greater hauling than producers have previously experienced. Presumably, some producers will need more trucks hauling beets during the two to three week harvest period than they have been accustomed to using. If there is any question whether adequate trucking would be available, then an alternative that reduces the growers hauling burden may be more realistic. To help you evaluate this situation, we are summarizing the one way distance traveled for each alternative as follows:

Alternative	Total miles traveled from farm to piler	Average one way distance per farm
1	7,130	23.2
2	5,590	18.2
3	4,032	13.1
4	3,830	12.5
5	3,398	11.1
6	3,168	10.3

Of the 181 producers whose beets would have to be hauled over 20 miles in alternative 1, 18 would have 40 to 60 mile hauls and 51 would have hauls of from 30 to 39 miles. The remaining 112 producers would have less than 30 miles to get their beets into the plant.

Similarly, of the 122 producers whose beets would have to be hauled over 20 miles in alternative 2, 4 producers would have to haul their beets 40 to 50 miles; 35 producers would have hauls of from 30 to 39 miles; and the remaining 83 producers would have less than 30 miles to get their beets into a beet pile.

You may be interested in data and judgements used to arrive at the total hauling costs shown in the last column of Table 1.

A piling station site was selected so as to be near the center of the area from which it drew beets, and next to a paved road. The specific location chosen for each piling station was as follows:

Piler site	Location
Clara City	One mile north east of Clara City on route 23. Also a former plant site in this study.
Rt 13-277	Eleven miles west of Raymond at the intersection of routes 13 and 277.
Bunde	Southeast of Clara City at the intersection of routes 7 and 1.

Piler site	Location
Hector	Two miles east of Hector at the intersection of route 212 with routes 22 and 67.
Redwood	Four miles west of Redwood Falls at the inter-section of route 19-67 and route 6 north.

About the same quantity of beets was assigned to each piler, even though this "forced" a few producers to go longer distances than would be required to minimize their costs. The Redwood station utilized a single ramp piler for 82,300 tons of beets, forcing larger quantities to other pilers compared to alternatives without the Redwood piling station. We assigned quantities of from 124,000 to 141,000 tons to the double ramp pilers depending upon the alternative and location. In a normal operating situation, the Silver Engineering Works expects their single ramp piler to handle 8,500 tons in 20 hours and the double ramp piler to handle about 10,600 tons in 20 hours. This suggests that at least 12 to 14 days would be required to pile an average crop.

Investment includes the estimated cost of pilers, scale and scale house, site leveling and surfacing, wiring, contingencies and, at piler stations, the cost of buying land. Cost of land at the plant was not included since the same amount of land would likely be purchased regardless of the quantity of beets piled on it. The investment costs illustrate the differences that should occur between alternatives, but may not be the actual costs we would settle upon as our analysis continues.

Hauling cost in Table 1 is the total of costs to haul beets from the farm to a piler and from piling stations to the plant. Thus they include the over 20 mile subsidy payment discussed in the foregoing. We used several hauling rates. Based upon your estimate of negotiated custom hauling rates of 3.5 to 4 cents per ton mile, we chose a mid-point of 3.75 cents per ton mile. This rate was applied to the one way distance, and covers cost of the return trip. Producers would pay an additional amount, around 10 cents per ton, to load the truck in the field.

Rates chosen for hauling from piler to plant were 4 cents per ton mile for distances over 20 miles, and 4.5 cents per ton mile for distances under 20 miles. We also applied these rates to the one way distance. It includes the return trip cost. These rates may be one-half cent higher than rates that would be available for year-round service. By changing these rates, the dollar differences between alternatives will change, but their ranking from least cost to higher cost should not change.

Other factors beyond the scope of this analysis such as availability of water, power, site characteristics and the like may influence your decision in selecting processing plant and piler station sites. We hope the information included in this letter-report, however, will be a helpful contribution to the decision-making process.

Sincerely,

David Volkin
Senior Agricultural Economist-
  Organizational Specialist

Phillip F. Brown
Agricultural Economist